

## **APPENDIX B: USFWS BIOLOGICAL OPINION, DECEMBER 22, 2021**





# United States Department of the Interior

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December 22, 2021

Serge Stanich  
Director of Environmental Services  
California High-Speed Rail Authority  
770 L Street, Suite 620  
Sacramento, California 95814  
Serge.Stanich@hsr.ca.gov

Subject: Formal Consultation on the California High-Speed Rail System: San Jose to Merced Project Section

Dear Serge Stanich:

This letter is in response to the California High-Speed Rail Authority's (Authority) request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the San Jose to Merced Project Section of the California High-Speed Rail (HSR) System (project) in Santa Clara, San Benito, and Merced counties, California. This letter is sent to the Authority in its role as the federal lead agency for the San Jose to Merced Project Section under the National Environmental Policy Act (NEPA) and other federal laws. Pursuant to 23 United States Code (U.S.C.) 327, under the NEPA Assignment Memorandum of Understanding (MOU) between the Federal Railroad Administration (FRA) and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews and approvals for all Authority Phase 1 and Phase 2 projects. Under the MOU, the Authority has been assigned FRA's Endangered Species Act (Act) Section 7 (16 U.S.C. 1536) responsibilities for consultations (formal and informal) with respect to HSR and other projects described in subpart 3.3 of the MOU.

At issue are the project's effects on the following federally listed species and critical habitats:

Species federally listed as endangered:

- San Joaquin kit fox (*Vulpes macrotis mutica*) (kit fox)
- California condor (*Gymnogyps californianus*) (condor)
- least Bell's vireo (*Vireo bellii pusillus*) (vireo)
- blunt-nosed leopard lizard (*Gambelia silus*) (lizard)
- Coyote ceanothus (*Ceanothus ferrisiae*)
- Metcalf Canyon jewelflower (*Streptanthus albidus ssp. albidus*) (jewelflower)

- Santa Clara Valley dudleya (*Dudleya setchellii*) (dudleya)
- Tiburon paintbrush (*Castilleja affinis ssp. neglecta*)
- vernal pool tadpole shrimp (*Lepidurus packardi*) (tadpole shrimp)

Species federally listed as threatened:

- giant garter snake (*Thamnophis gigas*)
- California red-legged frog (*Rana draytonii*) (frog) and its designated critical habitat
- Central California Distinct Population Segment of California tiger salamander (*Ambystoma californiense*) (salamander) and its designated critical habitat
- Bay checkerspot butterfly (*Euphydryas editha bayensis*) (butterfly) and its designated critical habitat
- valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle)
- vernal pool fairy shrimp (*Branchinecta lynchi*) (fairy shrimp)

Critical habitat has been designated for the condor, vireo, beetle, tadpole shrimp, and fairy shrimp. Because no designated or proposed critical habitat for these species occurs in the action area, it is not considered in this biological opinion.

This response is provided under the authority of the Act of 1973, as amended (16 U.S.C. 1531 et seq.), and in accordance with the implementing regulation pertaining to interagency corporation (50 Code of Federal Regulations [CFR] 402).

The federal action on which we are consulting is the construction, operation, and maintenance of the Authority's San Jose to Merced Project Section of the HSR. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment (BA) and a BA supplement for our review and requested concurrence with the findings presented therein. These findings conclude the project may affect and is likely to adversely affect the following federally listed species: the vireo, the frog, the salamander, the butterfly, the beetle, the tadpole shrimp, the fairy shrimp, the jewelflower, and the dudleya.

In considering your request, we based our evaluation on the following:

- 1) Extensive coordination between the Service and the Authority (and the FRA prior to the MOU, as described above) from April 2015 to October 2021 regarding the project, conservation measures, and framework for evaluating the effects on federally listed species
- 2) The June 24, 2020, letter from the Authority to the Service requesting initiation of formal consultation
- 3) The *San Jose to Merced Project Section Biological Assessment*, dated June 2020, and supplemental information provided November 2021
- 4) Correspondence between the Authority and the Service
- 5) Other information available to the Service

The Authority determined that the project, as proposed, may affect but is not likely to adversely affect the kit fox, the lizard, giant garter snake, Coyote ceanothus, and Tiburon paintbrush. The

Service concurs with this determination as the effects will be discountable for the following reasons:

- 1) The species have not been documented in the action area within the last 10 years and are not expected to occur in the action area,
- 2) Conservation measures as provided below under Description of the Project, including CM-GEN-07: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training and CM-PLT-01: Conduct Pre-Construction Surveys for Listed Plants and Implement Avoidance and Minimization Measures will be implemented and will avoid adverse effects should the species unexpectedly occur within the action area,
- 3) The conservation measure below specific to the kit fox,
- 4) The small amount of suitable habitat in the action area.

#### Conservation Measures Specific to San Joaquin Kit Fox

#### **CM-SJKF-01: Conduct Pre-Construction Surveys for San Joaquin Kit Fox and Implement Exclusion Areas around Potential Dens**

Within 30 days prior to the start of any ground-disturbing activity in each work area<sup>1</sup> from the Pajaro River in San Benito and Santa Clara Counties east along the entire alignment excluding areas directly above the tunneled alignment, the Designated Biologist will conduct pre-construction surveys in suitable habitat for kit fox in the work area plus a 500-foot buffer (where access permitted). If no potential dens or sign of kit fox are observed, no further measures will be required. The surveys will be phased with project buildout and the start of activities at each work area.

Potential dens will be monitored for a minimum of five consecutive nights with a trail camera and tracking medium to evaluate den status and determine the presence/absence of kit fox. A potential den includes all natural earthen dens/burrows with entrances/tunnels 3.5 inches in diameter or larger, but for which there are no historical records or current evidence of use. If there is a risk that cameras may be stolen or vandalized, then at that site, monitoring may be conducted using tracking medium only with prior concurrence from the Service. All potential kit fox dens will be mapped and photo documented and described in the survey report. The Project Biologist will submit a survey findings report prior to start of ground-disturbing activities to the Authority to document compliance with this measure. Once dens are monitored and shown to be unoccupied, they will be collapsed the next day following the fifth consecutive night of species absence. Should a survey result in positive identification of the kit fox or should kit fox be encountered during construction, the Designated Biologist will require all activities that could adversely affect individuals to stop and the Service will be notified within 24 hours to determine if reinitiation of Section 7 consultation is warranted. Any such cessation of activities will be limited to the area necessary to protect the species pending further direction from the Service.

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<sup>1</sup> For the purposes of this biological opinion, the *work area* is defined as the portion of the project footprint that is currently under active construction.

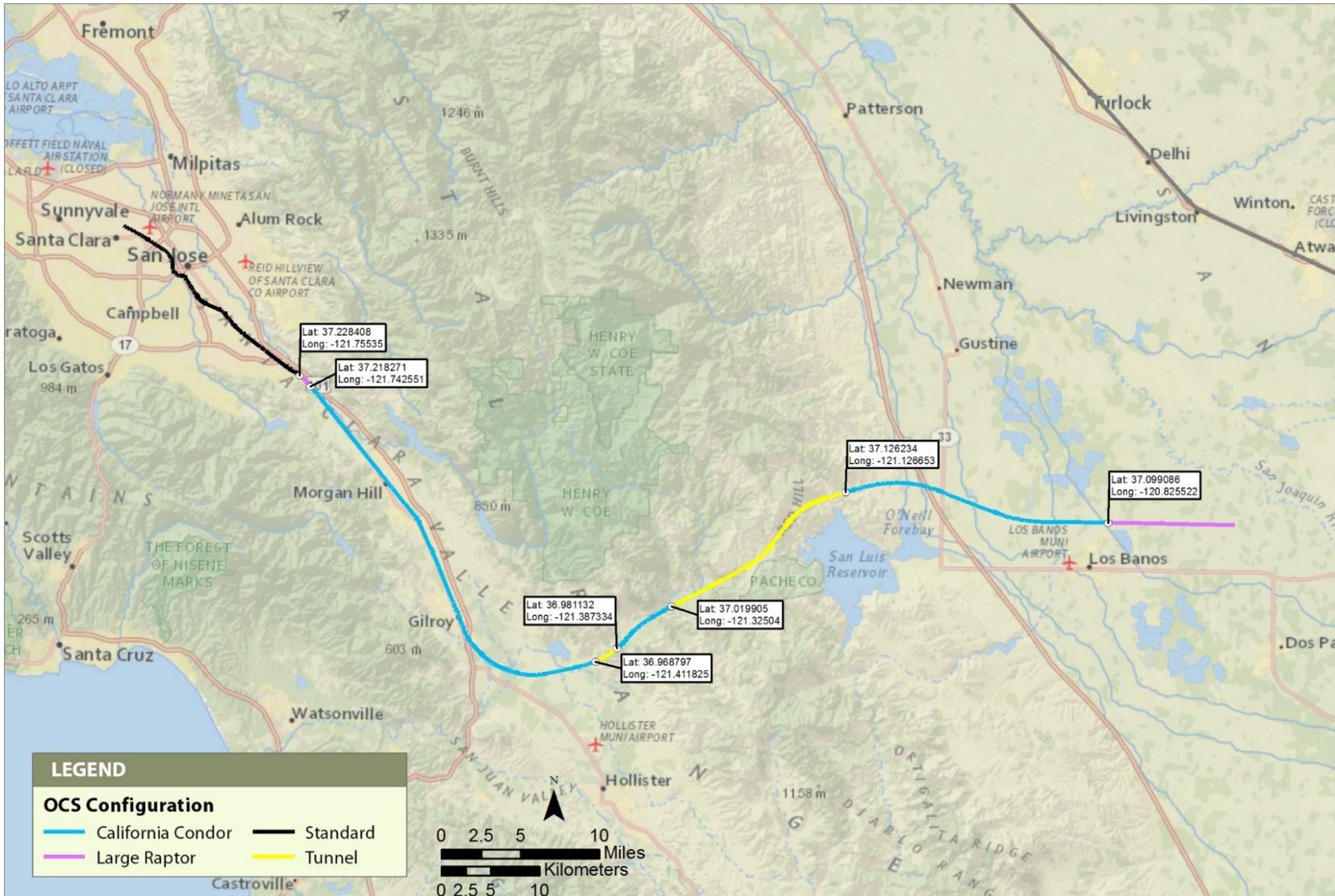
The Authority determined that the project, as proposed, may affect but is not likely to adversely affect the condor. The Service concurs with this determination as the effects will be discountable for the following reasons:

- 1) Implementation of species-specific conservation measures, as provided below (CM-CACO-01 through CM-CACO-07), will avoid adverse effects,
- 2) Implementation of general conservation measures, as described under the Description of the Project, including CM-GEN-20: Design the Project to Be Bird Safe, which states that the project, including the catenary system, masts, and other structures such as fencing, electric lines, communication towers and facilities, will be designed to be bird and raptor-safe (i.e., avoid electrocution and strike) in accordance with applicable Avian Power Line Interaction Committee (APLIC) recommendations in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012),
- 3) The Authority's commitment to designing the project's overhead catenary system to provide a minimum safe distance between the conductors of 83 horizontal inches and 52 vertical inches to avoid condor electrocution between the latitude and longitude positions indicated on the map below (Figure 1),
- 4) No nesting habitat for the condor occurs within the action area.

#### **CM-CACO-04: Implement Avoidance Measures for California Condor**

During any ground-disturbing activities in the range of condor, the Project Biologist will implement the following avoidance measures:

- Construction materials in work areas, including items that could pose a risk of entanglement, such as ropes and cables, will be properly stored and secured when not in use.
- Litter, small artificial items (screws, washers, nuts, bolts, etc.), and all food waste will be stored in self-closing, sealable containers with lids that latch to prevent entry by wind, common ravens, and mammals. All trash receptacles will be inspected and collected regularly; the contents disposed of from work areas on a daily basis to prevent spillage and maintain sanitary conditions. The receptacles will be removed from the work area when construction or operations and maintenance (O&M) activities are complete.
- All fuels, fluids, and components with hazardous materials or wastes will be handled in accordance with applicable regulations. These materials will be kept in segregated, secured and/or secondary containment facilities as necessary. Any spills of liquid substances that could harm wildlife will be immediately addressed.



.Figure 1. Overhead Catenary System Bird-Safe Configuration Locations

- The project will avoid the exposure of wildlife to antifreeze containing ethylene glycol by keeping parked vehicles/equipment free of leaks, particularly antifreeze, and immediately cleaning up any spills or discharges that arise from leaks.
- Polychemical lines will not be used or stored on site to preclude wildlife, especially condor, from obtaining and ingesting pieces of polychemical lines.

#### **CM-CACO-05: Implement Helicopter Avoidance Measures for California Condor**

In the event helicopters are needed, the Project Biologist will coordinate with the Service, as appropriate, prior to helicopter use that could affect condor, to establish that no known individuals are in the work area. If condors are present, helicopter use will be avoided until the birds have left the area. If condors are observed in helicopter work areas, further helicopter use will be avoided until the Designated Biologist or Biological Monitor has determined that the condors have left the area. The Designated Biologist and Biological Monitors will have radio contact with the project foreman, who will be in radio contact with the helicopter pilot. The biologist will provide real-time information updates to the project foreman and helicopter pilot to avoid conflicts with condors.

#### **CM-CACO-06: Stop Work and Implement Hazing Methods for California Condor**

If a condor(s) lands or is observed in or near a work area, the Designated Biologist or Biological Monitor will assess the construction activities occurring and determine whether there is a potential hazard to the condor. Activities determined to be a potential hazard will be stopped until the condor has abandoned the area. After 15 minutes, if a condor has not left of its own volition, the Designated Biologist or Biological Monitor, or other Service-approved personnel, will implement Service-approved hazing methods in accordance with the Service Recovery Program's *Guidance on Hazing California Condors* (Service 2014a).

If the condor does not leave the area within 30 minutes of the initiation of hazing, the Designated Biologist or Biological Monitor will notify the Project Biologist. The Project Biologist will coordinate with the Authority and the Service to determine the appropriate actions.

#### **CM-CACO-07: Implement Removal of Carrion That May Attract California Condor**

Dead and injured wildlife found in the right-of-way and tracks will be removed during construction and O&M when the train is in operation. During O&M within condor range, automated security monitoring and track inspections will be used to detect fence failures and/or the presence of carrion in the right-of-way.

Term and Condition #5 of the biological opinion will help ensure that the above measures and determinations remain accurate and supported prior to construction of the project.

The remainder of this document provides our biological opinion on the effects of the project on the vireo, the frog and its critical habitat, the salamander and its critical habitat, the butterfly and its critical habitat, the beetle, the tadpole shrimp, the fairy shrimp, the jewelflower, and the dudleya.

## Consultation History

April to December 2015	The Authority initiated informal consultation with the Service; coordinated meetings with the Service; provided maps of the proposed alignments and species models to the Service; requested a list of species for consideration for the BA.
January to December 2016	The Authority coordinated with the Service regarding species information, modeling, and mitigation.
January 2017 to May 2020	The Authority coordinated with the Service regarding species information, modeling, mitigation, and effects analysis.
June 24, 2020	The Authority submitted documents initiating formal consultation with the Service, including providing the <i>San Jose to Merced Project Section Biological Assessment (BA)</i> for review.
June 24 to October 26, 2020	The Authority and the Service held meetings and conferences to discuss the need for additional information.
October 26, 2020	The Service requested additional information from the Authority.
October 26, 2020 to August 2021	The Authority and the Service held workshops and reviewed Service comments on the BA.
August 25, 2021	The Authority requested formal consultation with the Service for the project and submitted supplemental information to the BA.

## BIOLOGICAL OPINION

### Description of the Project

#### *Project Overview*

The State of California proposes to build a HSR system to connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The HSR system is envisioned as an electrically powered, high-speed, steel-wheel-on-steel-rail technology with state-of-the-art safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment.



Overall, the project will be comprised of 15.2 miles on viaduct, 30.3 miles at grade, 25.9 miles on embankment, 2.3 miles in trench, and two tunnels with a combined length of 15.0 miles (Figure 3). The project comprises five subsections that are shown in Table 1 and illustrated on Figure 3.

**Table 1. San Jose to Central Valley Wye Project Subsections**

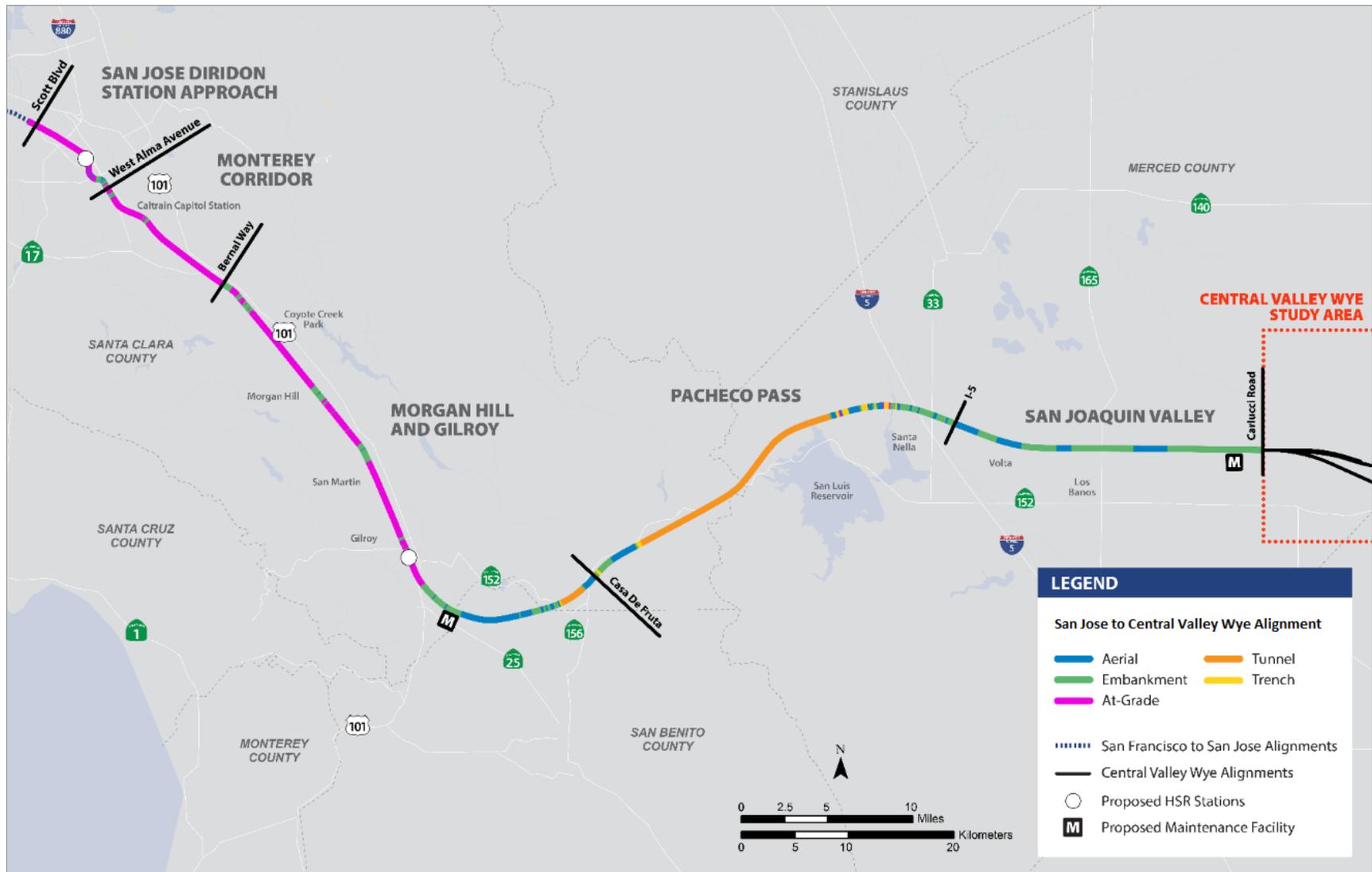
Subsection	Start	End
San Jose Diridon Station Approach (overlaps southern portion of San Francisco to San Jose Project Section)	Scott Boulevard (city of Santa Clara)	West Alma Avenue (city of San Jose)
Monterey Corridor	West Alma Avenue (city of San Jose)	Bernal Way/Kittery Court (community of South San Jose, city of San Jose)
Morgan Hill and Gilroy (includes Gilroy Station)	Bernal Way (community of South San Jose, City of San Jose)	Casa de Fruta Parkway (community of Casa de Fruta, Santa Clara County)
Pacheco Pass	Casa de Fruta Parkway (community of Casa de Fruta, Santa Clara County)	Interstate 5/Santa Nella Boulevard (community of Santa Nella, Merced County)
San Joaquin Valley	Interstate 5/Santa Nella Boulevard (community of Santa Nella, Merced County)	Carlucci Road (unincorporated Merced County)

Source: Authority 2019

### *Project Footprint*

The project footprint extends to the physical limits of the construction activities associated with the action and includes all areas that will be permanently or temporarily affected by the action. The project footprint includes all components and rights of way (ROW) needed to construct, operate, and maintain all permanent HSR features between the Project Section's logical termini. The estimated project footprint (i.e., combined permanent and temporary disturbance areas) for the action is expected to be no greater than approximately 4,004 acres.

The project footprint primarily consists of rail ROW that would include both a northbound and a southbound track in a corridor ranging from 60 feet wide, where elevated on a viaduct, to several hundred feet wide, where on embankment or in cut. Additional ROW would be required to accommodate associated facilities and improvements, such as maintenance facilities and equipment storage areas, permanent access roads, traction power substations (TPSS), switching and paralleling stations, train signaling and communication facilities, grade separations (overheads and underpasses), intrusion protection barriers, and wildlife crossing structures. The project footprint also includes areas for utility relocations, roadway relocations, electrical power connections, and construction activities (e.g., laydown, storage, and similar areas). The project footprint consists of the limits of cut and fill, plus all access roads and areas required for operating, storing, and refueling construction equipment.



Source: Authority 2019

JUNE 2019

Figure 3. San Jose to Central Valley Wye Alignment by Profile Type

Due to the Design/Build nature of the project, design refinements will occur as construction progresses, which may result in shifts in the project footprint into adjacent habitat. In addition, acquisition of ROW will provide access for surveys and updated habitat mapping. The HSR system, project footprint, and modeled habitat acreages included in the text below are based on the best available information at this time. Regardless of the final project footprint, project impacts will be similar geographically as well as in general nature and magnitude.

The following sections describe the project infrastructure.

#### San Jose Diridon Station Approach Subsection

The project will begin at Scott Boulevard in blended service with Caltrain on an at-grade profile following Caltrain Main Track (MT) 2 and MT3 south along the east side of the existing Caltrain corridor. The existing Lafayette Street pedestrian overpass will remain in place, as will the De La Cruz Boulevard and West Hedding Street roadway overpasses. New UPRR track will start just south of Emory Street to maintain freight movement capacity north of San Jose Diridon Station. The new UPRR track will be east of Caltrain MT1. The existing Santa Clara Station will remain. The existing College Park Caltrain Station will be reconstructed just north of Emory Street on the west side of the Caltrain Corridor on the existing siding track to eliminate the existing holdout rule at the station. A portion of both legs of the UPRR Warm Springs Subdivision Lenzen Wye will undergo minor track adjustments, and a new bridge will be built over Taylor Street for UPRR to tie into the Lenzen Wye.

The blended at-grade alignment will continue along MT2 and MT3 to enter new dedicated HSR platforms at grade at the center of San Jose Diridon Station. HSR platforms will be extended south to provide 1,385-foot and 1,465-foot platforms and will be raised to provide level boarding with the HSR trains. The existing Santa Clara Street underpass will remain, but the track in the throat and yard will require modification. There will be no need for modifications to the (Santa Clara) Valley Transportation Authority (VTA) light rail.

Continuing south, the blended at-grade three-track alignment will remain in the Caltrain right-of-way through the Gardner neighborhood. The existing underpass at Park Avenue and the existing overpass at San Carlos Street will remain in place. Four-quadrant gates with channelization will be built at Auzerais Avenue and West Virginia Street. A new bridge for the blended HSR/MT3 track over Interstate (I-) 280 will be constructed. The existing underpasses at Bird Avenue and Delmas Avenue will be reconstructed, as will the rail bridge overpasses. New standalone rail bridges over Prevost Street, State Route (SR) 87, the Guadalupe River, and Willow Street will be built for MT3. MT1 and MT2 will remain on the existing structures. The existing Tamien Caltrain Station will remain in place.

#### Monterey Corridor Subsection

The Monterey Corridor Subsection will be approximately 9 miles long and entirely within the San Jose city limits. From the San Jose Diridon Station Approach at West Alma Avenue, just south of the Caltrain Tamien Station, the alignment will extend primarily southeast to Bernal Way. This subsection will be in blended service with Caltrain on an at-grade profile within the Caltrain and UPRR right-of-way. HSR and Caltrain will operate on the electrified MT2 and MT3 tracks, while UPRR will operate on

a nonelectrified MT1. The two existing tracks will be shifted to accommodate the third track. The existing Tamien Caltrain Station will remain in place with two new electrified turnback tracks constructed south of the station to facilitate turning trains outside the station platform areas. The Michael Yard will be reconfigured to a double-ended facility to accommodate storage of Altamont Corridor Express trains and relocated to the east side of the corridor. A new standalone bridge over West Alma Avenue will be constructed for MT3 and a maintenance track, with MT1 and 2 remaining on the existing structure. A new bridge over Almaden Road will be constructed for MT2 and MT3, while MT1 will remain on the existing structures. The bike path at Almaden Expressway will be realigned to the west in a culvert under the roadway. The existing pedestrian overpass at Communications Hill will remain in place. Capitol Caltrain Station will be reconstructed with a new center platform between MT2 and MT3. The platform will be reached by a new pedestrian overpass built at the north end of the platform. The existing Capitol Expressway overpass will remain in place. Four-quadrant barrier gates with channelization will be built at Skyway Drive, Branhan Lane, and Chynoweth Avenue. The existing Blossom Hill Road overpass and adjacent pedestrian overpass will remain in place. The Blossom Hill Caltrain Station will be reconstructed; the existing pedestrian overpass and platform will be removed and a new center platform constructed between MT2 and MT3. The platform will be reached by a new pedestrian overpass built at the south end of the platform. Great Oaks Parkway will be realigned for approximately 1,350 feet to accommodate the widened rail corridor. SR 85 and Bernal Road overpasses will remain in place.

#### Morgan Hill and Gilroy Subsection

The Morgan Hill and Gilroy Subsection will be approximately 32 miles long, continuing south from the Monterey Corridor Subsection. From Bernal Way in South San Jose, the alignment will extend through Morgan Hill and San Martin to the Downtown Gilroy Station, then curve generally east across the Pajaro River floodplain and through a portion of northern San Benito County before entering Tunnel 1 at the base of the Diablo Range. The alignment will exit the tunnel at Casa de Fruta Parkway/SR 152 in unincorporated eastern Santa Clara County, where it will transition to the Pacheco Pass Subsection. This subsection will be blended service with Caltrain on an at-grade profile within the Caltrain and UPRR right-of-way with an at-grade Downtown Gilroy Station. Past the Downtown Gilroy Station and south of the U.S. Highway (US) 101 overpass, HSR will enter the fully grade-separated, dedicated track needed to operate HSR trains at speeds faster than 125 mph.

Beginning at the southern limit of the Monterey Corridor Subsection, the alignment will continue in blended service with Caltrain on an at-grade profile in the existing UPRR right-of-way. HSR and Caltrain will operate on the electrified MT2 and MT3 tracks, while UPRR will operate on MT1. A UPRR siding track will be provided between Blanchard Road and Bailey Avenue. Four-quadrant barrier gates will be installed at all existing public road crossings. Intrusion deterrents will be installed at all at-grade crossings. Three private roads crossing will be eliminated, and alternate access provided to those properties. The existing Bailey Avenue overpass will remain in place. The Monterey Road underpass will be reconstructed to accommodate the future widening of Monterey Road to four lanes. The Morgan Hill Caltrain Station will be reconstructed with two new side platforms built outside MT2 and MT3. The platform will be reached by a new pedestrian underpass constructed at the north end of the platform. The existing

Butterfield Boulevard overpass will remain in place. Upper Llagas Creek bridge will be reconstructed.

The San Martin Caltrain Station will be reconstructed—the existing platform will be removed and a new center platform will be built between MT2 and MT3. The platform will be reached by a new pedestrian overpass constructed at the south end of the platform. The existing bridge at Miller Slough will be replaced with a triple-cell box. Blended service will end just south of the Downtown Gilroy Station, where Caltrain will have access to turn back and stabling tracks relocated from the station area to south of 10<sup>th</sup> Street on the west side of the UPRR right-of-way. The Gilroy Caltrain Station will be reconstructed—the existing Caltrain platform will be shifted south and served by a southbound station track. A northbound Caltrain side platform will be provided to the east of a northbound station track. Two side platforms will be provided for HSR on the outside of the MT2 and MT3 tracks. The platforms will be reached by a new pedestrian overpass constructed over the center of the platforms. HSR will continue south under the US 101 overpass, which will remain in place. Past the Industry spur, HSR will ascend onto embankment and then a bridge over the UPRR. Two bridges will be constructed, one for MT2 and MT3 and a separate one for the maintenance of way facility (MOWF) lead track. The UPRR Hollister branch line will be realigned to the west to accommodate HSR bridging over the UPRR tracks at a single location. HSR MT2 and MT3 will descend from the embankment before crossing over Bloomfield Avenue on a new structure. Four-quadrant barrier gates and intrusion deterrents will be installed at Bloomfield Avenue for the MOWF lead track and UPRR service track. HSR will continue past the MOWF and transition to a new viaduct structure to cross over the Pajaro River.

The HSR alignment south and east of Gilroy will cross an agricultural area in Santa Clara and San Benito Counties that is part of the upper Pajaro River (UPR) floodplain, historically referred to as Soap Lake. The HSR guideway will be on viaduct over the major watercourses to provide a floodplain crossing that is neutral to the hydrology and hydraulics of the floodplain and to accommodate wildlife movement. Because of the Calaveras fault crossing at this location, Tequisquita Slough will be partially filled by approximately 800 feet of HSR embankment. The embankment area will include cross-culverts and 1.3 acres of adjacent floodwater detention basins; in addition, an extended viaduct over Pacheco Creek will serve to maintain floodplain capacity and function. HSR will be on embankment between Pacheco Creek and Lovers Lane, returning to viaduct at Lovers Lane. After Lovers Lane, the alignment will continue in a combination of embankment and viaduct until reaching the west portal for Tunnel 1 on the east side of SR 152. After exiting the 1.4-mile Tunnel 1 on the west side of SR 152, the alignment will cross over SR 152 and the southern portion of the Pacheco Creek Valley on an aerial structure south of Casa de Fruta. The alignment will transition onto embankment just beyond Southside Way at the western transition to the Pacheco Pass Subsection.

#### Pacheco Pass Subsection

The Pacheco Pass Subsection will be approximately 25 miles long. The alignment will generally follow the existing SR 152 corridor east from Casa de Fruta for approximately 17 miles, then diverge north around the Cottonwood Creek ravine of the San Luis Reservoir for approximately 8 miles before transitioning to the San Joaquin Valley Subsection near I-5 in Merced County. Tunnel is the only design option in this subsection.

From the eastern limit of the Morgan Hill and Gilroy Subsection, the guideway will transition from aerial structure to embankment along the southern boundary of Casa de Fruta. This stretch of embankment will be on fill or in excavated hillside cuts to accommodate a level HSR guideway profile over varied surface elevations and to control unstable slopes known for vulnerability to landslip (i.e., areas subject to the downward falling or sliding of a mass of soil, detritus, or rock on or from a steep slope). The alignment will ascend to viaduct over Pacheco Creek along the south side of SR 152 and remain on viaduct to the Tunnel 2 west portal. This portal will include a staging area for tunnel construction and a permanent area for traction and facility power with access provided by a service road from SR 152. Tunnel 2 will extend approximately 13.5 miles northeast. Access to the Tunnel 2 east portal for HSR construction, operations, and maintenance will be on McCabe Road north of Romero Ranch. Continuing east, the HSR guideway will be predominantly on a combination of embankment and aerial structures, with viaducts over Romero Creek and the California Aqueduct. Romero Road will be realigned at its intersection with I-5. East of I-5, the alignment will cross over SR 33/Santa Nella Road and the Central California Irrigation District (CCID) Outside Canal before transitioning to the San Joaquin Valley Subsection at Fahey Road.

#### San Joaquin Valley Subsection

The San Joaquin Valley Subsection will be approximately 18 miles long, from east of I-5 (at Fahey Road) to the intersection of Henry Miller Road and Carlucci Road in Merced County, where the alignment will connect to the Central Valley Wye. The single design option in this subsection is Henry Miller Road—a combination of viaduct and embankment.

South of Fahey Road, the guideway will continue east and cross over three irrigation ditches, Cherokee Road, the CCID Main Canal, two additional irrigation ditches, and adjacent farmland on viaduct. Continuing east, the alignment will be on embankment (including four proposed culvert crossings for irrigation ditches) before ascending on an approximately 1.4-mile-long viaduct over the San Luis Wasteway, the UPRR West Side branch line, and Ingomar Grade Road.

The alignment will descend to embankment west of Volta Road while turning southeast before crossing to the south side of Henry Miller Road. Henry Miller Road will be realigned to pass over the HSR alignment on a bridge. The HSR embankment between the Volta Road overcrossing and Los Banos Creek will cross over two proposed culverts to maintain irrigation canals. The alignment will then ascend to cross over Los Banos Creek and Badger Flat Road on a 1.35-mile-long viaduct before descending onto embankment.

The alignment will continue east for 3.6 miles on embankment over several combined wildlife crossing/drainage culverts and drainage culverts, including an irrigation ditch at Wilson Road, an irrigation ditch at Johnson Road, two irrigation ditches at Nantes Avenue, the Santa Fe Canal, the San Luis Canal, the San Luis Drain, and the Porter-Blake Bypass. A road will be constructed between Badger Flat Road and Nantes Avenue. SR 165/Merced Springs Road will be raised to cross over the HSR alignment and Henry Miller Road on a bridge. East of SR 165 and the Santa Fe Grade, the alignment will ascend to an approximately 1.8-mile viaduct south of the Los Baños State Wildlife Area across Mud Slough to maintain wildlife movement within the Grasslands Ecological Area (GEA). Baker Road, Midway Road, and Hereford/Salt Slough will be closed south of

Henry Miller Road. Box Car Road will become a cul-de-sac with a new road to the east. Hutchins Road will be abandoned. The alignment will continue on embankment to the eastern limit of the subsection and the project. Culvert crossings will be provided for the San Pedro Canal, Boundary Drain, Longe Tree Canal, Devon Drain, West Delta Drain, West Delta Canal, Dambrosia Ditch, Delta Canal and seepage drain, East Delta Canal, Poso Drain, Belmont Drain, Delta Canal #1, West San Juan Drain, San Juan #1, and several other irrigation ditches and drains in the section of viaduct over the GEA. Several local roadways—Delta Road, Turner Island Road, and Carlucci Road—will be elevated over the HSR guideway, maintaining access to adjacent properties. The alignment will transition to the Central Valley Wye at Carlucci Road.

A typical train will be 9 to 11 feet wide and approximately 660 feet long and will seat up to 1,000 passengers. The power will be distributed to each train car via the overhead contact system (OCS) through a pair of pantographs that extend like antennae above the train. Each trainset will have a train control system that could be independently monitored with override control, while also communicating with the systemwide Operations Control Center. Phase 1 HSR service is expected to need up to 78 trainsets in 2040, depending on the HSR fares charged and ridership levels (Authority and FRA 2017). Vehicle lighting will comply with applicable rail safety, security, and operational requirements.

The fully grade-separated, dedicated track infrastructure needed to operate HSR trains at speeds greater than 125 mph has more stringent alignment requirements than infrastructure for conventional trains. The project will use multiple track support types, or profiles: low, near-the-ground tracks will be at grade; higher tracks will be elevated on structure (viaduct) or on embankment; and below-grade tracks will be in open cut, retained cut, trench, or tunnel. Types of bridges that might be built include full channel spans, large box culverts, and, for wider river crossings, limited piers below the ordinary high-water mark of the established channel. Two tunnels will be constructed: one in the Morgan Hill to Gilroy Subsection and one in the Pacheco Pass Subsection. Flood lighting or night lighting will not be installed along the HSR guideway for track operations or maintenance, except for specific sited facilities such as maintenance and systems sites. Lighting will be used with closed-circuit televisions (CCTVs). In spaces where lighting will be inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used. Temporary, portable lighting will be used at all locations when maintenance work is being undertaken to ensure sufficient light levels to undertake the works safely.

Traction power switching and paralleling stations work together to balance the electrical load between tracks and to switch power off or on to either track in the event of an emergency. Traction power switching stations will be required at approximately 15-mile intervals, midway between the TPSSs. Each traction power switching station will encompass approximately 14,400 square feet (160 by 90 feet). Traction power paralleling stations will be required at approximately 5-mile intervals between the traction power switching stations and the TPSSs. Each traction power paralleling station will encompass approximately 9,600 square feet (120 by 80 feet), and each will include an approximately 450-square-foot (18 by 25 feet) control room.

During normal system operations, the local utility will provide power service through the TPSSs. Should the flow of power be interrupted, the system will automatically switch to

a backup power source through use of an emergency standby generator, an uninterruptable power supply, or a direct current battery system. Permanent emergency standby generators for the project will be located at passenger stations and at terminal layup or storage and maintenance facilities.

A computer-based, enhanced automatic train control (ATC) system will control the trains. The enhanced ATC system will comply with the FRA-mandated positive train control (PTC) requirements, including safe separation of trains, over-speed prevention, and work zone protection. This system will use a wireless-based communications network that will include a fiber optical backbone and communications towers at intervals of approximately 1.5 to 3 miles, depending on the terrain and selected radio frequency. Signaling and train control elements within the right-of-way will include components and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. Communications radio towers in these facilities will use a 6- to 8-foot-diameter 100-foot-tall pole. The communications facilities will be sited in the vicinity of track switches and will be grouped with other traction power, maintenance, station, and similar HSR facilities where possible. Where communications towers cannot be co-located with TPSSs or other HSR facilities, the communications facilities will be sited near the HSR corridor in a fenced area approximately 20 by 15 feet. ATC and standalone radio sites will not be staffed. Permanent safety lighting will incorporate motion sensors, height limits, shielding, and downward-facing orientation while still meeting safety, security, and operational criteria. Fencing around signaling and train control facilities may be screened. Lighting will be used with CCTVs. In spaces where lighting is inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used.

As previously described, each TPSS will have two 115/50-kV or 230/50-kV single-phase transformers. These transformers will interconnect the TPSS to two breaker-and-a-half bays<sup>5</sup> constructed at a new utility switching station or within the fence line of an existing facility via a short section of 230-kV transmission or 115-kV power lines (tie-line). Per Authority requirements, the proposed interconnection points will need redundant transmission (i.e., double-circuit electrical lines) from the point of interconnection, with each interconnection connected only to two phases of the transmission source. A new utility switching station will encompass approximately 35,200 square feet (160 by 220 feet) and include an approximately 975-square-foot (15 by 65 feet) control building, 525-square-foot (15 by 35 feet) battery building and, if required, a retention basin. The utility switching station could be screened from view with perimeter walls or fences. Communication facilities (i.e., redundant [two underground or one underground and one overhead on existing power structures] fiber optic lines) will also be required to support the electrical interconnections connecting TPSSs to new utility switching stations or to existing facilities, typically within tie-line/utility corridors.

The project includes the following components:

- Alignment and ancillary features
  - Approximately 90 miles of railway consisting of 15.2 miles on viaduct, 30.3 miles at grade, 25.9 miles on embankment, 2.3 miles in trench, and two tunnels with a combined length of 15.0 miles
  - Approximately 15.2 miles of dual HSR track

- Approximately 29 at-grade road crossings
- Associated railway support structures (e.g., TPSSs, switching/paralleling stations, MOWFs)
- Electrical interconnections
  - Two 115/50 kV or 230/50 kV single-phase transformers for each TPSS
  - New 115 kV or 230 kV switching station or reconfiguration of existing facility within fence line
- Network upgrades
  - Reconductor two 115 kV power lines
  - Collocation of new power lines with existing 230 kV transmission lines

### *Heavy Maintenance Facilities*

Three sites for the MOWF are under consideration. The East Gilroy MOWF will be located west of the HSR mainline, south of the community of Old Gilroy, extending from north of Pacheco Pass Highway (SR 152) to north of Bloomfield Avenue. The South Gilroy MOWF will be located in one of two locations—between Carnadero Avenue and Bloomfield Avenue on the east side of the HSR alignment or south of Bloomfield Avenue on the west side of the HSR alignment.

A maintenance of way siding (MOWS) is proposed near Turner Island Road near the eastern limit of the project. The MOWS will be about 0.5 mile long, encompassing about 4 acres. The facility will be constructed near Henry Miller Road to avoid the GEA and other sensitive habitat.

### *Stations*

Two stations will be constructed for the project in San Jose and Gilroy. The San Jose Diridon Station will be constructed at the existing Caltrain station. A second station—in the Morgan Hill and Gilroy Subsection—will be constructed in either downtown Gilroy or east Gilroy, depending upon the alternative selected. Conceptual station plans at both stations provide space for a multitude of services, including local and regional transit connectivity, pick-up and drop-off facilities, parking, station buildings for ticketing and support services, and passenger waiting and access area for HSR. Station planning will incorporate pedestrian and bicyclist connectivity; improved station area roadways for facilitating connectivity; expanded sidewalks, pathways, and plazas; rider pick-up and drop-off areas; and automobile parking.

### *Project Roadway Modifications*

State highway and local roadway modifications include:

- **State highway underpasses**—Where the HSR alignment is proposed to cross over state highway facilities in various locations on aerial structures, the possibility of encroachment into the California Department of Transportation (Caltrans) right-of-way will depend upon the placement of the HSR aerial structure columns. Temporary closure of the Caltrans right-of-way may be necessary for placement of precast aerial structure sections, during which time traffic will be detoured onto local streets.
- **Roadway overcrossings**—Where the HSR alignment is at grade and runs parallel to state facilities, access will be severed where an at-grade leg of an intersection crosses

the HSR alignment. Accordingly, road overcrossings will be necessary for maintaining function of the state highway and local road systems. Intersecting roads will be realigned horizontally and adjusted vertically to cross over the state highway. The possibility of encroachment into the Caltrans right-of-way will depend upon the placement of the overcrossing columns. The design intent of these crossings is to maintain the existing intersection and traffic patterns during construction. However, when conforming to the existing roads, some short-term closures may be required, and local traffic will utilize one of the other overcrossings or intersections in the vicinity.

- **Eliminating leg of intersections**—The elimination of one leg of an existing at-grade intersection with a state highway was deemed necessary where the road was in close proximity to other accessible, proposed overcrossings or where the existing average annual daily traffic was not high enough to warrant its own overcrossing. In these circumstances, the access will be severed along the leg of the intersection that the HSR track traverses. There will be no impacts on the Caltrans right-of-way as no structures are required. Local traffic will utilize one of the other overcrossings in the vicinity.
- **Ramp modifications**—Ramp modifications will be necessary where the HSR track is on an aerial structure, and the proposed columns directly interfere with the existing alignments of roadways or off-ramps. These ramps will be modified to avoid the proposed columns and accommodate any other roadway realignments that result from the aerial structure columns. Although the modifications will be slight, additional right-of-way may be required for the realigned off-ramps. Roadway traffic will likely use existing facilities while the realigned ramps are being constructed.

#### *Project Construction Footprint*

The project will require the acquisition of residential, commercial, industrial, and agricultural properties to obtain adequate right-of-way for construction and operations. In the San Joaquin Valley Subsection, the alignment will traverse a portion of the GEA, requiring acquisition of land under conservation easement.

#### *Pre-Construction Activities*

During final design, the Authority will conduct several pre-construction activities to optimize construction staging and management. These activities include the following:

- Conducting geotechnical investigations to define precise geologic, groundwater, and seismic conditions along the alignment. The results of this work will guide final design and construction methods for foundations, underground structures, tunnels, stations, grade crossings, aerial structures, systems, and substations.
- Identifying construction laydown and staging areas used for mobilizing personnel, stockpiling materials, and storing equipment for building HSR or related improvements. In some cases, these areas will also be used to assemble or prefabricate components of guideway or wayside facilities before transport to installation locations. Precasting yards will be identified for the casting, storage, and preparation of precast concrete segments; temporary spoil storage; workshops, and the temporary storage of delivered construction materials. Field offices and temporary jobsite trailers will also be located at the staging areas. Construction laydown areas are part of the project footprint that is evaluated for potential environmental impacts;

however, actual use of the designated laydown areas will be at the discretion of the design-build contractor. That is, some of the laydown areas included in the engineering drawings may not be fully disturbed or disturbed at all. After completing construction, the staging, laydown, and precasting areas will be restored to pre-construction condition.

- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition will require strict controls to ensure that adjacent buildings, infrastructure, natural or community resources are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities prior to construction. The Authority will work with the utility companies to relocate or protect in place high-risk utilities, such as overhead tension wires, pressurized transmission mains, oil lines, fiber optical conduits or cables, and communications lines or facilities prior to construction.
- Implementing temporary, long-term, and permanent road closures to reroute or detour traffic away from construction activities. Handrails, fences, and walkways will be provided for the safety of pedestrians and bicyclists.
- Locating temporary batch plants to produce Portland Cement Concrete or asphaltic concrete needed for roads, bridges, aerial structures, retaining walls, and other large structures. The facilities generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. The Authority will implement procedures for reducing air emissions, mitigating noise impacts, and controlling the discharge of potential pollutants into storm drains or watercourses from the use of equipment, materials, and waste products.
- Conducting other studies and investigations, as needed, such as surveys of local business, farms or dairies, and wildlife refuges to identify usage, delivery, shipping patterns, and critical times of the day or year for business, planting, harvesting activities, or recreational activities. This information will help develop construction requirements and worksite traffic control plans, and identify potential alternative routes as well as necessary cultural resource investigations, historic property surveys, and wildlife surveys.

### *Major Construction Activities*

Major types of construction activities for the project include earthwork; bridge, aerial structure, and roadway crossings; railroad systems; and station construction, as briefly described in the following subsections.

#### Earthwork

Earthwork is a general term applied to the movement or removal of soils by mechanical equipment (excavation) and the placement and compaction of soils by mechanical equipment (embankment). Earthwork will be conducted using conventional earthmoving methods and heavy construction equipment, such as dozers, wheel loaders, scrapers, articulated trucks, rear dump trucks, or wagons. The type of equipment used will depend on the hauling distance, with trucks or wagons used for longer distances.

The HSR system seeks to balance the volume of soils needed for excavation and embankment and minimize the input of materials from quarries and disposal of materials outside of the right-of-way. This earthwork balance assumes that excavated soils will be suitable for use as embankment fill (Draft Biological Assessment, Appendix 2-C [Authority 2021]). The Authority is conducting geotechnical investigations within the HSR alignment to assess the geotechnical properties of existing soils, evaluate opportunities for soil re-use and determine improvements to make existing soils suitable for HSR re-use.

The project will require greater quantities of embankment than excavation, requiring approximately an additional 2.3 million 900,000 cubic yards of material, respectively. While fill material is likely to be acquired locally, ballast and subballast materials may be imported from off-site quarries. To minimize material transport, the preliminary engineering design has identified construction staging sites that will store excavated materials close to where they will be placed, minimizing repetitive handling of materials.

The project will require earthwork construction of 53 to 59 miles of embankment or trench construction. The high amount of earthwork is predominantly due to the embankment and at-grade profile through the Morgan Hill and Gilroy Subsection.

#### Bridge, Aerial Structure, and Roadway Crossing Construction

As is done for existing HSR systems around the world, the majority of the elevated guideways will be designed and built using single box segmental girder construction. Where needed, other structural types and construction methods will be considered. This section provides an overview of the construction methods required for foundations, substructures, and superstructures of bridges, aerial structures, and roadway crossings.

**Foundations.** A typical aerial structure foundation pile cap is supported by an average of four large-diameter (5 to 9 feet) bored piles. Depth of piles depends on the geotechnical conditions at each pile site. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional available pile installation methods include bored piles, rotary drilling cast-in-place (CIP) piles, driven piles, and a combination of pile jetting and driving.

Following completion of the piles, pile caps can be constructed using conventional methods supported by structural steel: either precast and pre-stressed piles or cast-in-drilled hole piles. For pile caps constructed near existing structures such as railways, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) can be used to minimize disturbances to adjacent structures. Sheet piling installation and extraction will likely be achieved using hydraulic sheet piling machines.

**Substructure.** Typical aerial structures of up to 90 feet will be constructed using CIP bent caps and columns supported by structural steel and installed upon pile caps. A self-climbing formwork system may be used to construct piers and portal beams more than 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the previous pour. In general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depend on the type of superstructure and spans they are supporting.

**Superstructure.** The selection of superstructure type will consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. Accordingly, the final design will depend on the selected means and methods of construction, such as full-span precast, span-by-span, balanced cantilever segmental precast, and CIP construction on falsework. These superstructure construction methods are described in full detail in the *San Jose to Merced Project Section Constructability Assessment Report* (Draft Biological Assessment, Appendix 2-C [Authority 2021]) and are summarized as follows:

- **Full-span precast construction**—Box girders will be precast and pre-stressed in advance as a full span and stored in a precasting yard. The 110-foot precast segments, weighing around 900 tons, will be transported along the previously constructed aerial guideway using a special gantry system.
- **Span-by-span precast segmental construction**—Shorter box girder segments will be precast and pre-stressed and stored in a precasting yard. These segments, limited to 12-foot segments weighing less than 70 tons, will likely be individually transported to the construction site by ground transportation. Once the gantry system is in place, construction will involve hoisting the segments from the ground and installing and tensioning the prestressing tendons to create the box girder.
- **Balanced cantilever segmental construction**—In locations where construction will occur over existing facilities that prevent equipment and temporary supports on the ground, balanced cantilever segmental construction may be used. Under this construction method, box girder segments (12-foot segments weighing less than 70 tons) that are either precast or CIP will be placed in a symmetrical fashion around a bent column. The segments will be anchored at the ends by cantilever tendons located in the deck slab, with midspan tendons balancing the weight between two cantilevers. Precast segments will be precast off-site, transported to the construction site, and installed incrementally onto a portion of the existing cantilever using ground cranes, hoisting devices, or a self-launching gantry. Segments can also be CIP and installed two at a time, one at each end of the balanced cantilever. Segments generated by CIP are generally longer than those in precast construction since they do not need to be transported to the construction site.
- **CIP Construction on Falsework**—The method involves creating a suspended formwork with either a launching girder or gantry system. Once the formwork is in position and reinforcements and prestressing are placed, concrete is poured and the prestressing is stressed. The formwork is then removed and moved to the next segment.
- Construction of road crossings and bridges will be similar to the approach described above for aerial structures. The superstructure will likely be constructed using precast, prestressed, concrete girders and CIP deck. Approaches to bridges will be earthwork embankments, mechanically stabilized earth wall, or other retaining structures.
- Crossings of existing railroads, roads, and the HSR will be constructed on the line of the existing road or offline at some locations. When constructed online, the existing road will be closed or temporarily diverted. When constructed offline, the existing road will be maintained in use until the new crossing is completed. Single tracking of

VTA service will be necessary during construction of the SR 87 bridge. The following project features are necessary for VTA to modify operations during construction: a new crossover with two powered switches south of Tamien Station, provision of power to six existing switches, and installation of track signals at these new and existing powered switches. Where HSR will cross over existing railroads, the Authority will coordinate with the rail operators to avoid operational impacts during construction. Where new roadway undercrossings of existing railroads are required, a temporary shoofly track will be constructed to maintain railroad operations during undercrossing construction.

### Tunnels

Tunnels will be used where the HSR system passes through a hill or mountain where the vertical profile is too deep to use an open cut to pass through the topography. The project will require the construction of two tunnels—Tunnel 1 in the Morgan Hill and Gilroy Subsection and Tunnel 2 in the Pacheco Pass Subsection. This is similar to what is anticipated for these project tunnels. These tunnels will be twin-bore, single-track tunnels, with lengths of approximately 1.6 and 13.5 miles, respectively, and a minimum internal diameter of 29.5 feet. Localized enlargements, or niches, may be required at intervals to accommodate equipment such as OCS tensioning devices, traction power paralleling stations, ventilation fans, communication equipment, signaling equipment, and drainage systems. Cross passages, placed no more than 800 feet apart, will be required between adjacent tunnels to provide emergency exits. The Authority will acquire exclusive underground property approximately 132 feet wide and 62 feet high to accommodate both tunnels and all support elements.

Preparation for and construction of these tunnels will occur over a 6-year period and will generally proceed as follows:

Construction of access roads to the future tunnel portal sites: a new access road will be constructed on the west side of SR 152 from Walnut Avenue to the east portal of Tunnel 1, and a new road and bridge across Pacheco Creek will be constructed to the west portal of Tunnel 2. McCabe Road will be improved to provide access to the east portal of Tunnel 2.

Construction of power system: overhead power lines will be installed to the construction staging areas, and portable diesel generators will be installed to provide backup power supply.

Preparation of tunnel portals: a large, level area will be constructed at each tunnel portal including installation of retaining walls to minimize grading and slope modification. At the portals for Tunnel 2, this construction will likely include hillside slope reduction or application of drainage techniques, as well as ongoing monitoring and maintenance, to reduce the potential for landslides. Tunnel portals will initially be used to store precast materials and equipment, assemble and maintain equipment, stockpile tunnel spoils, and conduct ongoing monitoring and measuring of safety and ventilation systems. Portals will also be designed to accommodate housing trailers, ventilation buildings, communications

equipment, power facilities, water and sewage, lighting and fencing, and clear areas for parking and storage.<sup>2</sup>

Manufacturing and transport of precast tunnel support materials: manufacturing of precast materials, such as the tunnel lining segments will occur off-site and be transported to the tunnel portals.

Tunnel excavation will likely be conducted using a combination of tunnel boring machines (TBMs) and conventional tunneling methods at either end of the tunnel portals. The type of machine used will be determined by the Authority's design-build contractor, based on the tunnel length, the particular geology of the project, the amount of groundwater present and its condition, and other factors. A detailed discussion of tunnel construction methods is available in the *San Jose to Merced Project Section: Conceptual Tunnel Design and Constructability Considerations – Pacheco Pass* (Authority 2017) and is summarized below:

- **Conventional tunneling methods**—The primary conventional tunneling method anticipated to be used is a roadheader, consisting of a boom-mounted cutting head, a loading device usually involving a conveyor, and a crawler traveling track to move the machine forward into the rock face. Drill-and-blast techniques and the use of hydraulic excavators could also be required. For conventional tunneling methods, the estimated power demand is 3,000 kVA to operate two roadheaders, two drill jumbos, and ancillary equipment, with 1,000 kVA emergency power supply.
- **TBMs**—TBMs are shielded or open-type machines consisting of a rotating cutting wheel, called a cutterhead, followed by a main bearing, a thrust system and trailing support mechanisms. Support mechanisms can include conveyors or other systems for muck removal, control rooms, electrical systems, dust removal, ventilation and mechanisms for transport of pre-cast segments. These machines excavate rock with disc cutters mounted in the cutterhead, and then transfer the excavated rock through openings in the cutterhead to a belt conveyor for removal from the tunnel. Following TBM excavation, a tunnel lining is built with steel ribs and lagging or precast concrete segments. The shield is then pushed forward with hydraulic jacks that thrust against the installed lining and the back of the tunnel shield. For TBM excavation, the estimated power demand for a single construction staging area of a twin-bore tunnel is 7,500 kVA to power two TBMs, trailing gear, and continuous conveyors, ventilation fans, lights, pumps, shop equipment, change house, yard lighting, and office trailers, as well as 4,000 kVA for an emergency power supply.
- **Transport of tunnel spoils**—Tunnel excavation will generate large volumes of soil and rock materials (an estimated 0.5 million cubic yards from Tunnel 1 and 4.3 million cubic yards from Tunnel 2). Tunnel spoils will be temporarily stockpiled at the tunnel portal and, depending on geotechnical properties, distributed along the alignment and reused for embankment fill or nonstructural fill. Depending on the rate of excavation completed, the transport of tunnel spoils could require approximately 160 three-axle dump truck trips per day at each tunnel portal (Draft Biological Assessment, Appendix 2-C [Authority 2021]).

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<sup>2</sup> Reinforced structures may be necessary for permanent support at tunnel portals. Permanent structures will be designed for the most unfavorable load combinations. Depending on the various conditions, including slope stability, static earth pressures, and seismic loading, slope stability mitigation measures may be required.

### Railroad Systems Construction

The HSR system will include trackwork, traction power electrification, signaling, and communications. After completion of earthwork and structures, trackwork is the first rail system to be constructed, and it must be in place at least locally to start traction power electrification and railroad signaling installation. Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on crossties or track slabs and field-welded into continuous lengths.

Tie and ballast, and slab track construction will be used. Tie and ballast construction, which will be used for at-grade and minor structures, typically uses crossties and ballast that are distributed along the track bed by truck or tractor. In sensitive areas, such as where the HSR is parallel to or near streams, rivers, or wetlands, and in areas of limited accessibility, this operation may be accomplished by using the constructed rail line for material delivery. For major civil structures, slab track construction will be used. Slab track construction is a nonballasted track form using precast supports to which the track is directly fixed.

Traction power electrification equipment to be installed includes TPSSs, traction power switching and paralleling stations, and the OCS. Traction power facility equipment and houses are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. Substations are assumed to be located every 30 miles along the alignment. Traction power switching stations are located every 15 miles and traction power paralleling stations every 5 miles along the alignment. The OCS is assembled in place over each track and includes poles, brackets, insulators, conductors, and other hardware.

Signaling equipment to be installed includes wayside cabinets and bungalows, communications radio towers, wayside signals (at track interlockings), switch machines, insulated joints, impedance bonds, and connecting cables. The equipment will support automatic train protection; enhanced automatic train protection; and PTC to maintain train separation, routing at interlocking, and speed.

### Station Construction

Because the HSR stations in San Jose and downtown Gilroy will be co-located with existing Caltrain stations, existing train operations will be maintained during HSR station construction/modification. The San Jose Diridon Station and downtown Gilroy station will be reconstructed to accommodate the HSR system and the east Gilroy station will be a new station. HSR stations require significant coordination and planning to accommodate safe and convenient access to existing businesses and residences, to complement transit-oriented and station-supportive development, and to accommodate traffic control during construction periods. The typical construction sequence at station areas will be as follows:

- **Demolition and Site Preparation**—The Authority will be required to construct detour roadways, new station entrances, construction fences and barriers, and other elements to replace the removal from service of existing facilities on the worksite. The Authority will be required to perform street improvement work, site clearing and earthwork, drainage work, and utility relocations. Additionally, electrical substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the Authority may be required to realign existing track.

- **Structural Shell and Mechanical/Electrical Rough-Ins**—For these activities, the Authority will construct foundations and erect the structural frame for the new station, enclose the new building, construct new platforms, and connect the structure to site utilities. Additionally, the Authority will rough-in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.
- **Finishes and Tenant Improvements**—The Authority will install electrical and mechanical equipment, communications and security equipment, finishes, and signage. Additionally, the Authority may install other tenant improvements if requested.

**San Jose Diridon Station.** The project will primarily involve installing new turnouts and modifying the configuration of San Jose Diridon Station to build two high-level, 1,400-foot platforms for HSR, retain two platforms for commuter and conventional intercity trains, provide passenger services and train operations support in new structures north and south of the existing station building, build new overhead concourses for passenger access to train platforms, and relocate the existing bus station in three stages to accommodate progressive growth in HSR services:

- San Francisco to Gilroy Early Service in 2027 will require all passenger platform improvements, HSR passenger and operations support in a building south of the existing station house, and an overhead concourse from the south HSR station building with ramps to the two HSR platforms. Access to existing subway ramps will be retained for HSR passenger egress.
- Valley-to-Valley Service in 2029 will require ramps from the south overhead concourse to the Caltrain platforms.
- Phase 1 Service in 2033 will require development of another HSR building north of the existing station house, relocation of the existing bus station at that location, a second overhead pedestrian concourse from the north HSR station building with ramps to all train platforms, and closure of all platform ramps down to the subway.

**Downtown Gilroy Station.** A Downtown Gilroy Station will be constructed. A pedestrian undercrossing will connect the new station entrances on either side of the track, and Caltrain service will not be interrupted for construction of the undercrossing. Track realignment work will, however, temporarily relocate the existing Caltrain platform. During work on the Caltrain and UPRR facilities, temporary tracks and platforms will be located at the future HSR platform locations as a shoofly.

The existing station platforms will be repurposed for longer HSR platforms with tracks on the inside and two shorter platforms on the outside for Caltrain, Amtrak, and Transportation Agency for Monterey County. A new overhead concourse will provide passenger access to all platforms.

**Other Stations Affected by HSR Construction.** Construction of the project will also affect the following existing Caltrain stations: Santa Clara Station, College Park Station, Capitol Station, Tamien Station, Blossom Hill Station, Morgan Hill Station, and San Martin Station. Construction work at these stations will be coordinated with the affected transit service providers to maintain access to and operation of existing facilities or provide temporary facilities to support continued operation during construction. Construction could entail shifting the position of the platforms or access, changing

platform types, providing grade-separated pedestrian access to platforms, maintaining parking capacity, and other methods to maintain operations.

#### *Construction Utility Requirements and Waste Disposal*

Contractors will need to use water for construction activities such as dust control during demolition of surface and subsurface features, excavation, soil compaction, landscape restoration, concrete work, general cleanup, hygiene, and drinking. If no available water sources exist near the site, then contractors will use tanker trucks, storage tanks, and/or water towers to provide water to the site. Contractors will temporarily store excavated materials produced by construction activities within the construction footprint. Wherever possible, they will return excavated soil to its original location to be used as backfill and dispose waste materials associated with construction, including soils unsuitable for backfill, in landfills permitted to take these types of materials.

#### *Construction Materials and Equipment*

Materials required for construction include steel rails, building materials for the maintenance facilities, control buildings, and power supply facilities, as well as concrete, reinforcing steel, ballast, cement, aggregates, specialized train system components, fuel, and water. Materials will be delivered and stored at the San Jose to Merced Project Section project site for use. Various construction types of equipment will be used and staged at the site, including but not limited to cranes, pile drivers, dump trucks, bulldozers, and bucket loaders.

#### *Construction Timeline*

Construction will likely proceed concurrently along the entire project alignment. When the project is funded, construction will occur over multiple phases over approximately 6 years. Construction will occur 5 days a week with 8-hour days (250 days per year), except for construction of the Pacheco Pass tunnels, which will occur 7 days a week, 24 hours per day. Trackwork within the existing railway will be predominantly performed at night and on weekends between San Jose and Gilroy, requiring short-term roadway closures and establishment of roadway detours while roadway approach grading and paving is performed and new crossing panels are set.

In addition to the standard construction period, 2 years of additional construction will be required after the initial Phase I start-up to reconnector the existing Spring to Llagas and Green Valley to Llagas existing power lines. This work will be completed within an approximately 24-month timeframe.

#### *Operations and Maintenance*

##### HSR Service

The conceptual HSR service plan for Phase 1 describes service from Anaheim/Los Angeles through the Central Valley from Bakersfield to Merced and northwest into the Bay Area, terminating in San Francisco. Subsequent stages of the HSR system include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento.

Train service will run in diverse patterns between various terminals. Three basic service types are envisioned:

- Express trains will serve major stations only, providing fast travel times between Los Angeles and San Francisco during the morning and afternoon peak.
- Limited-stop trains will skip selected stops along a route to provide faster service between stations.
- All-stop trains will focus on regional service.

The majority of trains will provide limited-stop services and offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns will be provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited-stop trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, the Central Valley between Fresno and Bakersfield, Palmdale in the high desert, and Sylmar and Burbank in the San Fernando Valley will be served by at least two limited-stop trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains will be extended south of Los Angeles as appropriate to serve projected demand.

The service plan provides direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers will need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their final destination. Generally, the Phase 1 conceptual operations and service plans offer a wide spectrum of direct-service options and minimize the need for passengers to transfer.

In 2029, the assumed first year of HSR operation, two trains per hour will operate during peak travel times and one train per hour off-peak travel times between San Francisco and Bakersfield. When Phase 1 operations occur, this biological opinion assumes the following service:

- Two peak trains per hour from San Francisco and Los Angeles (one in off-peak)
- Two peak trains per hour from San Francisco and Anaheim (one in off-peak)
- Two peak trains per hour from San Jose and Los Angeles
- One peak train per hour from Merced and Los Angeles
- One train per hour (peak and off-peak) from Merced and Anaheim

Total daily operations for the San Jose to Merced Project Section of the HSR system are shown in Table 2.

**Table 2. Total Daily Operations—San Jose to Merced Project Section**

Service Description	2029	2040
<b>Nonrevenue Trains</b>		
Between MOWF and Gilroy	0	0
Between MOWF and San Jose	0	0
Between MOWF and Merced	0	0
<b>Revenue Trains</b>		
Trains per peak hour (max, one-way)	2	7
Trains per off-peak hour (max, one-way)	1	4
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 am–10 pm (max)	40	148
Number of nighttime operations: 10 pm–7 am (max)	8	28
<b>Total Trains by Segment</b>		
Trains per peak hour (max, one-way)	2	7
Trains per off-peak hour (max, one-way)	1	4
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 am–10 pm (max)	40	148
Number of nighttime operations: 10 pm–7 am (max)	8	28
<b>Total Trains All Segments</b>		
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 am–10 pm (max)	40	148
Number of nighttime operations: 10 pm–7 am (max)	8	28
Total Daily Operations	48	176

MOWF = maintenance-of-way facility

### Maintenance Activities

The Authority will regularly perform maintenance along the track and railroad right-of-way as well as on the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the HSR system. Maintenance methods are expected to be similar to those of existing European and Asian HSR systems, adapted to the specifics of the California HSR. However, the FRA will specify standards of maintenance, inspection, and other items in a set of regulations (i.e., Rule of Particular Applicability) to be issued in the next several years, and the overseas practices may be amended in ways not currently foreseen. The brief descriptions of maintenance activities provided below are thus based on best professional judgment about future practices in California.

**Track and Right of Way.** The track at any point will be inspected several times each week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but will operate at a lower speed.

They will run between midnight and 5 a.m. and will usually pass over any given section of track once in the night.

Most adjustments to the track and routine maintenance will be accomplished in a single night at any specific location with crews and material brought by work trains along the line. When rail resurfacing (i.e., rail grinding) is needed, perhaps several times a year, specialized equipment will pass over the track sections at 5–10 mph.

Approximately every 4–5 years, ballasted track will require tamping. This more intensive maintenance of the track uses a train with a succession of specialized cars to raise, straighten, and tamp the track, using vibrating “arms” to move and position the ballast under the ties. The train will typically cover a 1-mile-long section of track in the course of one night’s maintenance. Slab track, the track support type anticipated at elevated sections, will not require this activity. No major track components are expected to require replacement through 2040.

Other maintenance of the right-of-way, aerial structures, culverts, drains, and bridge sections of the alignment will include culvert and drain cleaning, vegetation control (e.g., mowing, disking, or herbicide application), litter removal, rodent control, and inspection that will typically occur monthly to several times a year.

**Power.** The OCS along the right-of-way will be inspected nightly, with repairs being made when needed; these will typically be accomplished during a single night maintenance period. Other inspections will be made monthly. Many of the functions and status of substations and smaller facilities outside the trackway will be remotely monitored. However, visits will be made to repair or replace minor items and will also be scheduled several times a month to check the general site. No major component replacement for the OCS or the substations is expected through 2040.

**Structures.** Visual inspections of the structures along the right-of-way and testing of fire/life safety systems and equipment in or on structures will occur monthly, while inspections of all structures for structural integrity will be conducted at least annually. Steel structures will require painting every several years. Repair and replacement of lighting and communication components of tunnels and buildings will be performed on a routine basis. No major component replacement or reconstruction of any structures is expected through 2040.

**Signaling, Train Control, and Communications.** Inspection and maintenance of signaling and train control components will be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in-field inspection and testing of the system will be conducted four times a year using hand-operated tools and equipment. Communication components will be routinely inspected and maintained, usually at night, although daytime work may be undertaken if the work area is clear of the trackway. No major component replacement of these systems is expected through 2040.

**Stations.** Each station will be inspected and cleaned daily. Inspections of the structures, including the platforms, will be conducted annually. Inspections of other major systems, such as escalators, the heating and ventilation system, ticket-vending machines, and CCTV, will be performed according to manufacturer recommendations. Major station components are not expected to require replacement through 2040.

**Perimeter Fencing and Intrusion Protection.** Fencing and intrusion protection systems will be remotely monitored, as well as periodically inspected. Maintenance will take place as needed; however, fencing and intrusion protection systems are not expected to require replacement before 2040.

### *Compensatory Habitat*

The Authority will provide compensatory habitat mitigation that seeks to increase the amount of protected habitat for federally listed species; preserve and enhance important wildlife movement corridors; and consolidate and expand existing protected habitat.

The Authority will secure conservation easements and develop long-term management plans for compensatory mitigation sites. The list of potential compensatory mitigation sites has not been finalized and is subject to augmentation with Service approval. The final compensatory mitigation sites will be selected based on their relatively high conservation value (e.g., proximity to other protected habitats or conserved areas such as core habitat areas or linkages connecting core habitat patches); location within important wildlife movement corridors, recovery areas, or designated critical habitat; presence of listed species and/or suitable habitat (i.e., high species richness/high biodiversity sites); mitigation habitat overlap among species; and ability to satisfy the requirements of the Service and other permitting agencies. The permanent protection of the compensatory mitigation sites will also support goals identified for the jewelflower, the dudleya, the tadpole shrimp, the fairy shrimp, the beetle, the butterfly, the frog, the salamander, and the vireo in the recovery plans for these species by protecting habitat (Service 1998a, 1998b, 2002, 2005a, 2017a, 2019a).

For all proposed mitigation sites, long-term management plans, conservation easements, and funding analyses for the long-term endowments will be submitted to the Service for review and approval before the plans are finalized and implemented. The Authority may also purchase habitat compensation credits at a Service-approved mitigation site or conservation bank in addition to securing compensatory sites.

To avoid a temporal loss of habitat and reduce project effects on listed species, the Authority's proposed mitigation strategy includes securing compensatory mitigation prior to the start of construction. Compensatory mitigation will be secured in phases in accordance with the progress of construction of the San Jose to Merced Project Section. As such, the Authority's proposed mitigation strategy will ensure that the compensatory mitigation will be secured before or concurrent with the commencement of construction for each Construction Package (CP). In the event that it is not possible to secure all of the compensatory mitigation for each CP in advance, it will be completed no later than 18 months after the initiation of ground disturbance of each CP.

All areas of habitat loss for federally listed species will be documented in compliance reporting. This documentation will include geographic information system (GIS) data layers, associated metadata, and photo documentation of areas of habitat loss for each species. For each species, a cumulative acreage of habitat loss will be presented in a table.

### *Reporting*

The Authority will submit monthly and annual reports to the Service documenting compliance with the conservation measures and this biological opinion. The reports will

include summaries of the habitat assessment and species-specific pre-activity surveys and findings, observations and incidental take of threatened or endangered species, compliance with conservation measures successfully implemented, noncompliance events and corrections or adjustments to meet compliance, an accounting of the cumulative total number of acres of species suitable habitat that has been disturbed (with associated GIS layers, associated metadata, and photo documentation), and the type and number of acres for which compensatory mitigation has been secured.

### *Conservation Measures*

The Authority has proposed the following measures to minimize effects on federally listed species. The measures below are considered part of the project evaluated by the Service in this biological opinion.

The results of the habitat suitability modeling, described below, will be used as a guide during species' habitat assessment surveys. However, Designated Biologists (described below) will consider all areas in and adjacent to the project footprint when determining where surveys are warranted. Habitat assessment, protocol-level surveys when available, and pre-construction surveys will be phased with project buildout and the start of activities at each work area.

### General Conservation Measures

#### **CM-GEN-01: Establish Qualified Biologists and Biological Monitors**

At least 15 days prior to the onset of activities, the Authority will submit, for review and approval by the Service, the name(s), contact information, and relevant qualifications and experience of Project Biologists and Designated Biologists who will conduct activities specified in the following measures. The roles of biologists will be as follows:

- **Project Biologists.** For each section or construction package, the Authority will identify a Project Biologist(s). For their section or construction package, the Project Biologist(s) will be responsible for implementation of the conservation measures, oversee the scheduling and work of Designated Biologists and Biological Monitors, and develop compliance reporting.
- **Designated Biologists.** Designated Biologists will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. Designated Biologists may be Service-approved on a species-specific basis, in which case Designated Biologists will only be authorized to conduct surveys and implement other measures for the covered species for which they have been approved. The Designated Biologists will have support from Biological Monitors. Designated Biologists will submit memoranda and reports to the Authority to document compliance with conservation measures.
- **Biological Monitors.** Biological Monitors will report directly to a Designated Biologist for implementation of species measures or directly to the Project Biologist for implementation of general measures. Biological Monitors will be selected by the Authority based on their documented experience with and understanding of the ecology of the species included in this opinion. Biological Monitors will be responsible for conducting Worker Environmental Awareness Program (WEAP) training, implementing general conservation measures, conducting compliance monitoring, and reporting their compliance monitoring activities. Biological Monitors

also may assist Designated Biologists in implementing species-specific conservation measures under the direct, on-site, supervision of the Designated Biologist.

### **CM-GEN-02: Conduct Monitoring of Construction Activities**

The Designated Biologist or Biological Monitor will be present in the work area to verify compliance with avoidance and minimization measures, including during ground- or vegetation-disturbing activities in or adjacent to Environmentally Sensitive Areas (ESA), wildlife exclusion fencing (WEF), and construction exclusion fencing (exclusion fencing).

### **CM-GEN-03: Prepare and Implement a Biological Resources Management Plan**

Prior to construction activities, the Project Biologist will prepare the Biological Resources Management Plan (BRMP). The goal of the BRMP will be to provide the Project Biologist, Designated Biologists, and Biological Monitors with an organized reference and reporting tool to verify that the mitigation measures and terms and conditions are implemented and reported in a timely manner. The BRMP will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility designations. These will include all conservation measures and repair, mitigation, and compensatory actions included in the biological opinion. These measures and conditions will be tracked through final design, implementation, and post-construction phases. For all measures, terms, and conditions, requirements and planned mechanisms for documenting and reporting compliance will be identified. The BRMP will also identify the individual responsible for post-construction compliance reporting. All project environmental plans, such as the Restoration and Revegetation Plan (RRP) and Weed Control Plan (WCP), will be included as appendices to the BRMP. The BRMP will contain, but not be limited to, the following information:

- A master schedule that shows construction of the project, pre-construction surveys, and establishment of buffers and exclusions zones to protect sensitive biological resources
- Specific measures for the protection of special-status species
- Identification (on construction plans) of the locations and quantity of habitats to be avoided or removed, along with the locations where habitats are to be restored
- Identification of agency-approved Project Biologist(s), Designated Biologists, and Biological Monitor(s), including those responsible for notification and report of injury or mortality of federally- or state-listed species
- Measures to preserve topsoil and control erosion
- Design and locations of protective fencing around ESA and the construction staging areas
- Locations of trees to be protected as wildlife habitat (roosting sites) and locations for planting replacement trees
- Specification of the purpose, type, frequency, and extent of chemical use for insect and disease control operations as part of vegetative maintenance in sensitive habitat areas

- Specific measures for the protection of riparian areas. These measures may include erosion and siltation control measures, protective fencing guidelines, dust control measures, grading techniques, work area limits, and biological monitoring requirements
- Provisions for biological monitoring during ground-disturbing activities to confirm compliance and success of protective measures will: (1) identify specific locations of wildlife habitat and sensitive species to be monitored; (2) identify the frequency of monitoring and the monitoring methods (for each habitat and sensitive species to be monitored); (3) list required qualifications of Biological Monitor(s); (4) identify the reporting requirements; and (5) provide an accounting of impacts on special-status species habitat compared to pre-construction impact estimates
- Notification and reporting requirements in the event of an accidental death or injury to a federally listed species during project activities or failure to meet conservation measures included in the biological opinion

The BRMP will be submitted to the Authority for review and approval prior to any ground-disturbing activity.

#### **CM-GEN-04: Prepare and Implement a Restoration and Revegetation Plan**

Prior to any ground-disturbing activity, the Project Biologist will prepare a RRP to address temporary impacts resulting from ground-disturbing activities in areas that potentially support special-status species, wetlands, and other aquatic resources. Restoration activities may include but are not limited to: grading landform contours to approximate pre-disturbance conditions, re-vegetating disturbed areas with native plant species, and using certified weed-free straw and mulch. The Authority will implement the RRP in all temporarily disturbed areas outside of the permanent right-of-way that potentially support special-status species, wetlands, and/or other aquatic resources.

Consistent with Section 1415 of the Fixing America's Surface Transportation Act, restoration activities will provide habitat for native pollinators by planting native forbs and grasses. The Project Biologist will obtain a locally sourced native seed mix. The restoration success criteria will include limits on nonnative invasive species, as defined by the California Invasive Plant Council, to an increase no greater than 10 percent compared to the pre-disturbance condition, or to a level determined through a comparison with an appropriate reference site consisting of similar natural communities and management regimes. The RRP will be submitted to the Authority for review and approval.

#### **CM-GEN-05: Prepare and Implement a Weed Control Plan**

Prior to any ground-disturbing activity during the construction phase, the Project Biologist will develop a WCP.

The purpose of the WCP is to establish approaches to minimize and avoid the spread of invasive weeds during ground-disturbing activities during construction and O&M. The WCP will include, at a minimum, the following:

- A requirement to delineate ESAs in the field prior to weed control activities
- A schedule for weed surveys to be conducted in coordination with the BRMP

- Success criteria for invasive weed control will be linked to the BRMP standards for on-site work during ground-disturbing activities. In particular, the criteria will establish limits on the introduction and spread of invasive species, as defined by the California Invasive Plant Council, to less than or equal to the pre-disturbance conditions in the area temporarily affected by ground-disturbing activities. If invasive species cover is found to exceed pre-disturbance conditions by greater than 10 percent or is 10 percent greater than levels at a similar, nearby reference site, a control effort will be implemented. If the target, or other success criteria identified in the WCP, has not been met by the end of the WCP monitoring and implementation period, the Authority will continue the monitoring and control efforts, and remedial actions will be identified and implemented until the success criteria are met.
- Provisions to ensure consistency between the WCP and the RRP, including verification that the RRP includes measures to minimize the risk of the spread and/or establishment of invasive species and reflects the same revegetation performance standards as the WCP
- Identification of weed control treatments, including permitted herbicides and manual and mechanical removal methods
- Restrictions on herbicide use to avoid primary or secondary poisoning of special-status plant species and butterfly host plants and to require application by certified applicators in accordance with the compound label and other restrictions mandated by the U.S. Environmental Protection Agency, and requirements of the California Department of Pesticide Regulation, and County agricultural Commissioner.
- Timeframes for weed control treatment for each plant species
- Identification of fire prevention measures
- All vehicles and equipment will arrive at project sites free of plant and soil material within or near serpentine habitat

#### **CM-GEN-06: Facilitate Regulatory Agency Access**

Throughout the construction period, the Authority or its designee will allow access by the Service or other resource agency staff to the project site. Because of safety concerns, all visitors will check in with the Authority's resident engineer prior to entering the project footprint. If agency personnel visit the project footprint, the Project Biologist will prepare a memorandum within three business days after the visit documenting the issues raised during the field meeting. The Project Biologist will report any issues regarding regulatory compliance raised by agency personnel to the Authority.

#### **CM-GEN-07: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training**

Prior to any ground-disturbing activity, the Project Biologist will prepare a WEAP to train construction crews to recognize and identify sensitive biological resources that may be encountered in the vicinity of the project footprint. The WEAP training materials will be submitted to the Authority for review and approval. A video of the WEAP training prepared and presented by the Project Biologist and approved by the Authority may be used if the Designated Biologist or Biological Monitor is not available to present the training in person.

At a minimum, WEAP training materials will include the following information: key provisions of the Act, the California Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, California Fish and Game Code 1600, Porter-Cologne Water Quality Control Act, and the Clean Water Act; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; the contact person and procedures in the event of the discovery of a dead or injured wildlife species; and review of avoidance, minimization, and mitigation measures.

The Designated Biologist or Biological Monitor will present WEAP training to all construction personnel prior to working in the project footprint. As part of the WEAP training, construction timing in relation to species' habitat and life-stage requirements will be detailed and discussed on project maps, which will show areas of planned minimization and avoidance measures. Crews will be informed during the WEAP training that, except when necessary as determined in consultation with the Designated Biologist or Biological Monitor, travel in the project footprint is restricted to established roadbeds, which include all pre-existing and project-constructed unimproved and improved roads. Training materials will include a fact-sheet handout or wallet-sized card conveying this information to be distributed to all participants in WEAP training sessions and will be provided in other languages as necessary to accommodate non-English speaking workers. All construction staff will attend WEAP training prior to beginning work on-site and will attend the WEAP training on an annual basis thereafter.

Upon completion of the WEAP training, each construction crew training attendee will sign a form stating that they attended the training, understood the information presented, and agreed to comply with the requirements set out in the WEAP training. The Project Biologist will submit the signed WEAP training forms to the Authority monthly, and annually the Authority will certify that WEAP training had been provided to all construction personnel. Each month, the Project Biologist will provide updates relevant to the training to construction personnel during the daily safety (tailgate) meeting.

#### **CM-GEN-08: Conduct Operation and Maintenance Period WEAP**

Prior to initiating O&M activities, O&M personnel will attend a WEAP training session arranged by the Authority. At a minimum, O&M WEAP training materials will include the following information: key provisions of the Act, the California Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, Porter-Cologne Water Quality Control Act, and the Clean Water Act; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; and the contact person in the event of the discovery of a dead or injured wildlife species. The training will include an overview of provisions of the BRMP, annual vegetation and management plan, WCP, and security fencing, ESAs, and WEF maintenance plans pertinent to O&M activities. A fact sheet prepared by the Authority environmental compliance staff will be prepared for distribution to the O&M employees. The training will be provided by the Authority's environmental compliance staff. The training sessions will be provided to employees prior to their involvement in any O&M

activity and will be repeated for all O&M employees on an annual basis. Upon completion of the WEAP training, O&M employees will, in writing, verify their attendance at the training sessions and confirm their willingness to comply with the requirements set out in those sessions.

#### **CM-GEN-09: Establish Monofilament Restrictions**

Prior to any ground-disturbing activity, the Biological Monitor will verify that plastic monofilament netting (erosion control matting) or similar material is not being used as part of erosion control materials. Non-monofilament substitutes including coconut coir matting, tackified hydroseeding compounds, rice straw wattles, and reusable erosion, sediment, and wildlife control systems that have been approved by the regulatory agencies (e.g., ERTEC Environmental Systems products) may be used.

#### **CM-GEN-10: Avoid Animal Entrapment**

At the beginning and end of each workday all excavated, steep-walled holes or trenches that are more than 8 inches deep with sidewalls steeper than a 1:1 (45 degree) slope will be inspected for trapped animals and, at the close of each day, will be covered with plywood or similar materials or provided a minimum of one escape ramp constructed of fill earth per 10 feet of trenching. Before such holes or trenches are filled, they will be thoroughly inspected for trapped wildlife by the Biological Monitor(s).

All construction pipe, culverts, or similar structures with a diameter of 3 inches or greater that are stored overnight in the project footprint will be covered and elevated at least one foot above ground. Pipes or similar structures, regardless of diameter, will be covered such that avian entrapment is avoided. All pipes, culverts, and similar structures will be inspected for wildlife before such material is moved, buried, or capped.

#### **CM-GEN-11: Delineate Equipment Staging Areas and Traffic Routes**

Prior to any ground-disturbing activity, the Designated Biologist and Biological Monitor(s) will establish staging areas for construction equipment in areas that minimize effects on sensitive biological resources, including habitat for special-status species, seasonal wetlands, and wildlife movement corridors. Staging areas (including any temporary material storage areas) will be in areas that will be occupied by permanent facilities, where practicable. Equipment staging areas will be identified on final project construction plans. The Designated Biologist and Biological Monitor(s) will flag and mark access routes to ensure that vehicle traffic in the project footprint is restricted to established roads, work areas, and other designated areas.

#### **CM-GEN-12: Dispose of Construction Spoils and Waste**

The contractor will dispose of waste materials associated with construction, including soil materials unsuitable for reuse, in local landfills are permitted to take these types of materials, and in conformance with state and federal laws.

#### **CM-GEN-13: Establish Environmentally Sensitive Areas and Non-Disturbance Zones**

Prior to any ground-disturbing activity in a work area, the Project Biologist will use flagging to mark ESAs that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures. The Project Biologist will also direct the installation of WEF to prevent special-status wildlife species from entering work areas. The WEF will have exit doors to allow animals that

may be inside an enclosed area to leave the area. The Project Biologist will also direct the installation of construction exclusionary fencing (exclusionary fencing) at the boundary of the work area, as appropriate, to avoid and minimize impacts on special-status species or aquatic resources outside of the work area during the construction period. The ESAs, WEF, and exclusionary fencing will be fine mesh material (e.g., Animex Fencing or similar) and delineated by the Designated Biologist based on the results of habitat mapping or modeling and any pre-construction surveys, and in coordination with the Authority. The ESA, WEF, and exclusionary fencing locations will be identified and depicted on an exclusion fencing exhibit. The purpose of the ESAs and WEF will be explained at WEAP training and the locations of the ESA and WEF areas will be noted during worker tailgate sessions.

Fencing installation will be monitored by a Designated Biologist or Biological Monitor to ensure that federally listed species are not injured or killed during installation. Temporary fencing will be installed in areas of construction that are beyond the perimeter of the right-of-way or in areas where construction staging will occur. After installation of the temporary fencing, the work area will be surveyed by a Designated Biologist(s) to confirm the absence of federally-listed wildlife. The ESA, WEF, and exclusionary fencing will be regularly inspected and maintained by the Designated Biologist or Biological Monitors to ensure its integrity and that wildlife are not trapped.

#### **CM-GEN-14: Install Aprons or Barriers within Security Fencing**

Prior to final construction design the Project Biologist will review the fencing plans along any portion of the permanent right-of-way adjacent to natural habitats and confirm that the permanent security fencing will be enhanced with a barrier (e.g., fine mesh fencing) that extends at least 12 inches below ground and 12 inches above ground to prevent special-status reptiles, amphibians, and mammals from moving through or underneath the fencing and gaining access to areas in the right-of-way. At the 12-inch depth of the below grade portion of the apron, it will extend or be bent at an approximately 90-degree angle and oriented outward from the right-of-way a minimum of 12-inches, to prevent fossorial wildlife from digging or tunneling below the security fence. A climber barrier (e.g., rigid curved or bent overhang) will be installed at the top of the apron to prevent wildlife from climbing over the apron. The Project Biologist may coordinate with the Service prior to completion of the fencing design.

The Project Biologist will ensure that the selected apron material and climber barrier will not have the potential to cause harm, injury, entanglement, or entrapment to wildlife species. The Authority will provide for yearly inspection and repair of the fencing.

Prior to construction and operation, the Project Biologist will field inspect the fencing along any portion of the permanent right-of-way that is adjacent to natural habitats and confirm that the fencing has been appropriately installed. Both the fencing plan review and field inspection will be documented in memorandums from the Project Biologist and provided to the Authority.

#### **CM-GEN-15: Design and Maintain Wildlife Crossings to Facilitate Wildlife Movement**

The Authority will design and maintain all wildlife crossings created specifically for terrestrial species consistent with the guidelines and recommendations in the Wildlife Corridor Assessment (WCA) unless different dimensions are specified in authorizations

issued under the Act. To the extent feasible, all wildlife crossings created specifically for terrestrial species will include the following features and design considerations:

- Native earthen bottom
- Ledges or tunnels will be incorporated into the design to facilitate safe passage of small mammals
- Unobstructed entrances (e.g., no riprap, energy dissipaters, grates), although vegetative cover, adjacent to and near the entrances of crossings, is permissible
- Openness and a clear line of sight from end to end
- Cover materials within the crossing such as rock or brush piles where smaller animals can take cover
- Year-round absence of water for a portion of the width of the crossing (i.e., no flowing water)
- Where water is likely to be present within a crossing as a result of a high groundwater table or proximity to an existing floodplain, wildlife crossing design will include features to minimize water entry into the crossing (e.g., impermeable groundwater barriers, berms) and to maximize drainage and drying time (e.g., slopes, sump pumps, permeable soils)
- Where hydrologic flow-balancing features (culverts) provide wildlife connectivity, "shelves" will be constructed to allow small and medium animals to pass through the structure when it is flooded
- Slight grade at approaches to prevent flooding
- Hydrologic designs (ledges, cross slopes, water detention features, infiltration features, water proofing, or other features) to maintain crossing functionality (a dry crossing path) up to and including 100-year storm events for 95 percent of the year (347 days)
- Limited open space between crossing and cover/habitat
- Separation from human use areas (e.g., trails, multiuse undercrossings)
- Avoidance of artificial light at approaches to wildlife crossings
- Wildlife undercrossings, hydrologic flow balancing features, culverts, and bridges, as well as the entry and exit areas to these features, will be inspected annually for obstructions such as debris, overgrown vegetation, garbage, or other material that was not included in the original design or will reduce the intended function
- All needed maintenance, repairs, and clearing of wildlife movement structures will be performed within 6 months of inspection.

The Authority will incorporate features to accommodate wildlife movement into the design of bridges and culverts that are replaced or modified as part of project construction, wherever feasible. Project Biologist review of final construction design for consistency with placement and dimensions of wildlife crossings will be verified in a memorandum provided to the Authority.

**CM-GEN-16: Work Stoppage**

During construction activities, the Designated Biologists and general Biological Monitors will have stop work authority to protect any federally listed wildlife species in the project footprint. This work stoppage will be coordinated with the Authority or its designee. The Contractor will suspend vegetation- or ground-disturbing activities in the work area(s) where the potential construction activity could result in injury or mortality of listed species; work may continue in other areas. The Contractor will continue the suspension until the individual leaves voluntarily or is moved to an approved release area using Service-approved handling techniques and methods, or as required by the Service.

**CM-GEN-17: Enforce Construction Speed Limits**

A speed limit of 15 mph will be enforced during project construction for all vehicles operating on unimproved access roads and in temporary and permanent work areas in the limit of direct effect.

**CM-GEN-18: Implement Avoidance of Nighttime Light Disturbance**

Prior to construction requiring nighttime lighting, the Contractor will prepare a Lighting Plan verifying how the Contractor will shield nighttime construction lighting and direct it downward in such a manner to minimize the light that falls outside the construction site boundaries. The Lighting Plan will be submitted to the Authority for review and approval prior to any work requiring nighttime lighting. The Lighting Plan will describe the type of lighting that will be used, maximum level of lumens to be emitted, and a schematic showing where lighting equipment will be stationed and which cardinal direction(s) the lighting equipment will face.

Permanent or temporary, fixed, exterior lighting, including motion triggered security lighting that casts light beyond the project footprint between sunset and sunrise, will not be used.

**CM-GEN-19: Implement Water or Dust Palliative Measures**

Water or dust palliatives will be applied to the construction right-of-way, dirt roads, trenches, spoil piles, and other areas where ground disturbance takes place to minimize dust emissions and topsoil erosion. Dust palliatives will be nontoxic to wildlife and plants. For construction in suitable habitat for listed species, the Biological Monitor will patrol areas of disturbance to ensure that water does not puddle for long periods and attract listed species or other wildlife to the project site. Operational ponding will be avoided through careful grading and hydrologic design. Water tanks will be covered with secure lids. Leaking hoses, tanks, or other sources of inadvertent pooling will be repaired immediately or moved offsite.

**CM-GEN-20: Design the Project to Be Bird Safe**

Prior to final construction design, the Authority, in consultation with the Project Biologist, will ensure that the catenary system, masts, and other structures such as fencing, electric lines, communication towers and facilities are designed to be bird and raptor-safe in accordance with the applicable recommendations presented in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012).

Applicable APLIC recommendations include, but are not limited to:

- Ensuring sufficient spacing of phase conductors to prevent bird electrocution
- Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible
- Marking lines and fences (e.g., Bird Flight Diverter for fencing and lines) to increase the visibility of lines and reduce the potential for collision. Where fencing is necessary, using bird compatible design standards to increase visibility of fences to prevent collision and entanglement
- Installing perch guards to discourage avian presence on and near project facilities
- Minimizing the use of guy wires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian strikes (e.g. line markers)
- Structures will be monopole or dual-pole design versus lattice tower design to minimize perching and nesting opportunities. Communication towers will conform to *Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning* (Service 2018)
- Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid collision risks
- Use of facility lighting that does not attract birds or their prey to project sites. These include using non-steady burning lights (red, dual red and white strobe, strobe-like flashing lights) to meet Federal Aviation Administration requirements, using motion or heat sensors and switches to reduce the time when lights are illuminated, using appropriate shielding to reduce horizontal or skyward illumination, and avoiding the use of high-intensity lights (e.g., sodium vapor, quartz, and halogen). Lighting will not be installed under viaduct and bridge structures in riparian habitat areas
- Ensuring poles do not have openings that could entrap birds; including sealing or capping all openings in poles or providing for escape routes (e.g., openings accommodating escape for various species)
- Designing aerial structures (e.g., viaducts and bridges) and tunnel portals to discourage birds and bats from roosting in expansion joints or other crevices
- Insulated wire or tree wire will be used for all electrical conduits to increase visibility of wires and minimize potential for collision

Additional bird operational actions will be required for dry lakes and playas, Audubon Important Bird Areas, and documented avian movement corridors. These measures include:

- Avoid, to the extent feasible, siting transmission lines across canyons or on ridgelines to prevent bird and raptor collisions
- Install bird flight diverters on all facilities spanning or within 1,000 feet of stream and wash channels, canals, ponds, and any other natural or artificial body of water

Fencing or other type of flight diverter will be installed on all viaduct structures to encourage birds and raptors to fly over the HSR and avoid flying directly in the path of on-coming trains.

#### **CM-GEN-21: Prohibit Pets in Work Areas**

No pets will be allowed on site during construction or O&M.

#### **CM-GEN-22: Prepare Post-Construction Compliance Report**

A post-construction compliance report will be submitted to the Service upon completion of each construction package, as defined by the design-build contracts. The post-construction compliance report will provide the following information:

- Dates of project groundbreaking and completion
- Pertinent information concerning the success of the project in meeting compensation and other conservation measures
- Known project effects on listed species
- Observed incidences of injury or mortality of any listed species
- Other pertinent information

#### **CM-GEN-23: Notification of Dead, Injured, or Sick Wildlife**

The Authority will notify the Service within 24 hours if dead, injured, or sick listed species are observed.

#### Conservation Measures Specific to Federally Listed Plants

#### **CM-PLT-01: Conduct Pre-Construction Surveys for Listed Plants and Implement Avoidance and Minimization Measures**

Prior to ground- or vegetation-disturbing activities, the Designated Biologist will conduct surveys for listed plants' suitable habitat. The Designated Biologist(s) will conduct protocol-level surveys for federally listed plant species prior to any ground- or vegetation-disturbing activities in suitable habitat for federally listed plant species during the appropriate bloom period for each species. Habitat assessment and protocol-level surveys will be phased with project build-out and the start of activities at each work area.

The surveys will be consistent with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018) and *Guidelines for Conducting and Report Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (Service 2000). The Designated Biologist will flag and record in GIS the locations of any observed federally listed plant species. Prior to surveys and if a reference population exists, reference populations for target survey species will be visited to confirm bloom conditions and ensure target species have flowers or other discernible features necessary to identify plants.

If federally listed plants are observed during plant surveys, ESA fencing will be installed to protect the population or individuals, plus a 100-foot buffer (where access is permitted). In areas where construction occurs in modeled habitat that is occupied by serpentine-dependent federally listed plants, Section 3 (Construction Work) of the *Best Management Practices (BMP) for Preventing Phytophthora Introduction and Spread: Trail Work, Construction, Soil Import* (Swiecki and Bernhardt 2018) will be implemented.

If plants cannot be avoided, they will be documented prior to impacts. Documentation will include density and percent cover of the affected species; key habitat characteristics, including soil type, associated species, hydrology, and topography; and photo documentation of pre-construction conditions.

Prior to any vegetation- or ground-disturbing activity within temporary work areas, the Designated Biologist will stockpile and segregate the top 4 inches of topsoil from locations in the work area where federally listed plant species were observed during surveys. The topsoil will be stored on site and redistributed onto the temporary work area after construction completion.

#### Conservation Measures Specific to Bay Checkerspot Butterfly

##### **CM-BCB-01: Minimize Direct Impacts on Bay Checkerspot Butterfly Host Plants**

Prior to construction, the Designated Biologist will survey for Bay checkerspot larval host plants—dwarf plantain, purple owl’s-clover, and paintbrush—within suitable habitat. If host plants are found within the project footprint, construction personnel will avoid them to the extent feasible. Where avoidance is not feasible, ground disturbance will take place during the adult flight season (March 1–April 30).

#### Conservation Measures Specific to Valley Elderberry Longhorn Beetle

##### **CM-VELB-01: Conduct Pre-Construction Surveys for Valley Elderberry Longhorn Beetle**

Prior to vegetation- or ground-disturbing activities within the species’ range and in suitable habitat, an agency-approved Designated Biologist will search the work area for elderberry bushes with stems greater than 1 inch in diameter at ground level.

##### **CM-VELB-02: Develop Construction Setback and Erect Signage**

Within the species’ range and in suitable habitat, a no-activity buffer zone will be established around elderberry shrubs whose retention is feasible. A 165-foot (or wider) buffer will be established and maintained around elderberry plants containing stems measuring 1 inch or greater in diameter at ground level (Service 2017b).

The agency-approved Designated Biologist will erect signage every 50 feet along the edge of the 165-foot buffer area with the following information: *“This area is habitat of the valley elderberry longhorn beetle, a federally threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.”* The signs will be installed prior to the start of construction, must be clearly readable from a distance of 20 feet, and must be maintained by the Authority throughout the duration of construction activities.

#### Conservation Measures Specific to Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

##### **CM-VPS-01: Conduct Pre-Construction Surveys for Vernal Pool Species**

Prior to vegetation- or ground-disturbing activities within the species’ range, an agency-approved Designated Biologist will search for suitable seasonal wetland, vernal pool, and atypical wetland habitat (e.g., ditches, tire ruts) within the work area and a 250-foot buffer. Where suitable wetland habitat is identified, the Designated Biologist will visit these areas after the first rain event of the season to determine whether seasonal wetlands

and vernal pools have been inundated. A seasonal wetland, vernal pool, or other potentially suitable habitat (e.g., ditches, tire ruts) will be considered inundated when it holds more than 3 centimeters of standing water 24 hours after a rain event. Within 10 days after the pools have been inundated, the Designated Biologist will conduct surveys consistent with the *Survey Guidelines for the Listed Large Brachiopods* (Service 2017c). If surveys are not performed, the wetland habitat will be considered occupied. The Designated Biologist will submit a report to the Authority within 30 days of completing the work.

### **CM-VPS-02: Implement Seasonal Vernal Pool Work Restriction**

Initial ground-disturbing activities that will not overlap with occupied or assumed occupied vernal pool crustacean habitat but that will occur within 250 feet of occupied or assumed occupied habitat will be restricted to the dry season (June 2 to October 14) or when the habitat is dry (i.e., lacks flowing or standing water). If construction activities must occur within 250 feet of suitable habitat during the October 15–June 1 period, erosion control materials will be installed to reduce sedimentation into vernal pools and other suitable habitat.

### **CM-VPS-03: Establish and Monitor Vernal Pool Exclusion Zones**

Non-disturbance exclusion zones will be erected to minimize water quality and hydrologic impacts on the occupied or assumed occupied vernal pool crustacean habitat. The Designated Biologist will erect exclusion fencing 250 feet from the edge of occupied or assumed occupied seasonal wetland or vernal pool habitat, where accessible. The Biological Monitor(s) will monitor and maintain the vernal pool exclusion zones as directed by the Designated Biologist.

### Conservation Measures Specific to California Red-Legged Frog

#### **CM-CRLF-01: Conduct Pre-Construction Surveys for California Red-Legged Frog and Implement Avoidance Measures**

Where suitable habitat has been identified within the project work area and prior to ground-disturbing activities, a Designated Biologist will conduct a pre-construction survey of potential breeding and suitable upland habitat to evaluate the presence or absence of the frog, or presence will be assumed.

Surveys for the frog will be conducted within suitable habitat as described below.

- Surveys will occur no earlier than 24 hours prior to ground-disturbing activities in the work area.
- The Designated Biologist will conduct a pre-construction survey of suitable breeding habitat following the *Revised Guidance on Site Assessments and Field Surveys for The California Red-legged Frog* (Service 2005b) or other more recent guidelines, if available.
- The Designated Biologist will investigate all potential areas that could be used by frogs for feeding, breeding, sheltering, movement, and other essential behaviors.
- Found individuals will be moved a short distance by the Designated Biologist to undisturbed suitable habitat beyond the work area no more

than 300 feet from the nearest suitable aquatic habitat to the greatest extent feasible while still in the action area. Preferred locations are those nearest and most similar to the habitat where the animal was found and could include mammal burrows, dense vegetation, mud cracks, and leaf litter.

- Any survey, construction, operations, or maintenance activity that occurs within ponds or other aquatic habitat for the frog will implement the measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) for preventing the introduction and spread of amphibian diseases.

### **CM-CRLF-02: Install, Monitor, and Maintain Exclusion Barriers**

If occupied or assumed occupied habitat occurs adjacent to the work area, exclusion barriers (e.g., silt fences) will be installed, monitored, and maintained under direction of the Designated Biologist between the adjacent, suitable habitat and the work area, as described below.

- Exclusion barriers will be installed prior to initial ground-disturbing activities around the work area, or between the work area and occupied or assumed occupied habitat, as necessary to exclude individuals from entering.
- Exclusion fencing will be trenched into the soil at least 4 inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent individuals from passing under the fence.
- Barriers will be installed with turnarounds at any access openings needed in the fencing to redirect frogs away from gaps in the fencing.
- Exclusion fencing will be monitored and maintained by the Authority until all construction activities are completed.
- Outside the breeding season (April 1 to October 31), barriers will be inspected by the Designated Biologist or Biological Monitor at least twice weekly on nonconsecutive days.
- During the breeding season (November 1 to March 31), barriers will be inspected daily.

If exclusion fencing between occupied or assumed occupied habitat and the work area is not possible (e.g., no property access) or warranted given the activity extent or duration (e.g., temporary activities that only take a couple of weeks to complete), the following measures will be implemented.

- The Designated Biologist or Biological Monitor will be on site during all activities that occur within suitable habitat of frogs.
- Prior to any ground-disturbing activity during the dry season (June 1–October 15), the Designated Biologist will conduct a pre-construction survey of suitable habitat within the work area and a 100-foot buffer, where access is available. After pre-construction surveys are complete, daily surveys are not needed during the dry season.

- During the wet season (October 16–May 31), to the maximum extent practicable, no construction activities will occur during rain events or within 24 hours following a rain event.
- During the wet season (October 16–May 31), the Designated Biologist or Biological Monitor will inspect the work area and all equipment/materials for the presence of frogs following or during a rain event.
- If a frog is found during any season, the animal will be allowed to move away from the project site of its own volition or, if the animal is in danger, moved by the Designated Biologist.

### **CM-CRLF-03: Dewatering Aquatic Breeding Habitat**

If a suitable aquatic breeding feature that is occupied or assumed occupied needs to be dewatered by pumping, the following measures will be followed.

- The intakes will be completely screened with wire mesh not larger than 5 millimeters.
- Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction.
- If the aquatic feature is not within the project work area, any barriers to flow will be removed in a manner that will allow flow to resume with the least disturbance to the substrate upon completion of construction activities.
- Any construction, operations, or maintenance activity that occurs within ponds or other aquatic habitat for the frog will implement the measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) for preventing the introduction and spread of amphibian diseases

### Conservation Measures Specific to California Tiger Salamander

#### **CM-CTS-01: Conduct Pre-Construction Surveys for California Tiger Salamander and Implement Avoidance Measures**

Where suitable habitat has been identified within the project work area, prior to ground-disturbing activities, a Designated Biologist will conduct a pre-construction survey of potential breeding and suitable upland habitat to evaluate the presence or absence of salamanders, or presence will be assumed. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities in a work area. Within upland habitat, all mammal burrows will be hand excavated by a Designated Biologist. If possible, each burrow excavation will be conducted by slowly removing the burrow (including any side tunnels) or structures using hand tools (e.g., shovel, digging bar, garden trowel, masonry trowel, etc.). If hand tools cannot be used safely due to soil compaction, structural material present, and/or burrow depth extending greater than two feet from the surface, mechanical methods may be used. Mechanical methods will include either hand power tools or a backhoe and/or hand tools (e.g., shovel, garden trowel, masonry trowel, etc.). Cloth, cylinder, capped pipe, or similar material that would protect the integrity of the burrow will be pushed into the burrow approximately 12 to 16 inches to plug the burrow and prevent animals from exiting during excavation (i.e., to prevent injury or mortality). All burrows (including side burrows) will be excavated to their endpoints and the excavation will then be backfilled, brought back to grade, and compacted using the same equipment that was used for excavation. If any salamanders are found during excavation

or above ground within the work area, the Designated Biologist will relocate the individual(s). Found individuals will be moved a short distance by the Designated Biologist to undisturbed suitable habitat beyond the extent of the construction site no more than 300 feet from the capture location while still in the action area. Preferred locations are those nearest and most similar to the habitat where the animal was found and could include mammal burrows, dense vegetation, mud cracks, and leaf litter. Any survey, construction, operations, or maintenance activity that occurs within ponds or other aquatic habitat for salamander will implement the measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) for preventing the introduction and spread of amphibian diseases.

### **CM-CTS-02: Install, Monitor, and Maintain Exclusion Barriers**

If occupied or assumed occupied habitat occurs adjacent to a work area, exclusion barriers will be installed, monitored, and maintained along the perimeter of the work area to exclude individuals from entering the work area, as described below.

- The Authority, as directed by a Designated Biologist, will install exclusion barriers (e.g., silt fences) along the perimeter of the project footprint or between the project footprint and the adjacent, suitable habitat.
- Exclusion barriers will be installed prior to initial ground-disturbing activities around the work area, or between the work area and occupied or assumed occupied habitat, as necessary to exclude individuals from entering.
- Exclusion fencing must be trenched into the soil at least 4 inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent salamanders from passing under the fence.
- Barriers will be installed with turnarounds at any access openings needed in the fencing to redirect salamanders away from openings.
- Exclusion fencing will be monitored and maintained by the Authority throughout the salamander's entire active period (November to June) or until all construction activities are completed, whichever occurs first.
- Barriers must be inspected by a Designated Biologist or Biological Monitor at least twice weekly on nonconsecutive days outside the breeding season.
- Barriers will be inspected daily following any rain event and during the active period (November to June).

If exclusion fencing between occupied or assumed occupied habitat and the work area is not possible work will be restricted to the dry season between July and October.

### **CM-CTS-03: Dewatering Aquatic Breeding Habitat**

If a suitable aquatic breeding feature that is occupied or assumed occupied needs to be dewatered by pumping, the following measures will be followed.

- The intakes will be completely screened with wire mesh not larger than 5 millimeters.
- Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction.

- If the aquatic feature is not within the project work area, any barriers to flow will be removed in a manner that will allow flow to resume with the least disturbance to the substrate upon completion of construction activities.
- Any construction, operations, or maintenance activity that occurs within ponds or other aquatic habitat for the salamander will implement the measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) for preventing the introduction and spread of amphibian diseases.

#### Conservation Measures Specific to Least Bell's Vireo

##### **CM-LBVI-01: Conduct Pre-Construction Surveys and Implement Avoidance Measures for Least Bell's Vireo**

No more than 30 days prior to any ground- or vegetation-disturbing activity, the Designated Biologist will make an initial site visit to determine if suitable habitat for the vireo exists in the work area, plus a 500-foot buffer (where access is permitted).

Where suitable habitat is present, the Designated Biologist will conduct surveys prior to ground- or vegetation-disturbing activities, adhering to guidance in *Least Bell's Vireo Survey Guidelines* (Service 2001).

Habitat assessment and species surveys will be phased with project build-out and the start of activities at each work area. Following the surveys, the Designated Biologist(s) will conduct bimonthly surveys (every 2 weeks) during construction activities that occur within 500 feet of suitable habitat during the nesting season for the vireo as required by the survey guidelines. If construction activities are subsequently halted or delayed by more than 2 weeks (14 days) during the nesting season for the vireo, the Designated Biologist(s) will repeat surveys 5 days prior to the reinitiation of construction activities. Upon reinitiation of construction activities, the Designated Biologist will conduct the bimonthly surveys. A survey report will be transmitted to the Authority prior to the initiation of ground- or vegetation-disturbing activities at the survey site.

If a vireo bird or nest is detected within 500 feet of construction or maintenance activities, the Designated Biologist will establish a 300-foot no-work buffer (where access is permitted) around the individual or nest to the extent practicable. The Designated Biologist may adjust the size of the no-work buffer in coordination with the Authority and Service. The Designated Biologist or Biological Monitor will have the authority to halt work if vireo individuals exhibit distress and/or abnormal nesting behavior.

The no-work buffer will remain in place until the Designated Biologist has determined that the individual(s) has left the area or the nest has failed or the young have fledged and are no longer reliant upon the nest site. The Designated Biologist will adjust the no-work buffer size and/or location to ensure that adults and young are not adversely affected by construction.

For construction activities involving the use of a helicopter, the nest buffer for federally listed nesting birds will be 500 feet horizontal and 300 feet vertical. Buffers will be measured from the location of the nest, regardless of where the nest is located.

## Action Area

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” The action area includes the project footprint and the lands surrounding it. The project footprint includes the rail alignment as well as associated project structures such as roadway improvements, overcrossings, related ancillary facilities, and other permanent project elements, such as tunnel portals. The project footprint includes 4,004 acres, 138 acres of which are mapped as developed. The area affected by disturbance from noise, vibration, dust, and lighting during project construction and operation extends 1,000 feet from both sides of the project footprint. Therefore, the total action area that will be evaluated for potential effect from the San Jose to Merced Project Section of the HSR system under this biological opinion is 32,901 acres.

## Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of” means to engage in an action that reasonably will be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the action area without the consequences to the listed species caused by the project, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines all consequences to listed species that are caused by the proposed federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the project is likely to jeopardize the continued existence of the listed species.

## Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of “destruction or adverse modification” (DAM) was published on August 27, 2019 (84 Fed. Reg. 44976). The final rule became effective on October 28, 2019. The revised definition states:

“*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.”

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the current rangewide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the current condition of the critical habitat in the action area without the consequences to designated critical habitat caused by the project, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the *Effects of the Action*, which determines all consequences to designated critical habitat that are caused by the proposed federal action on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) *Cumulative Effects*, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of critical habitat, the Service formulates its opinion as to whether the action is likely to destroy or adversely modify designated critical habitat. The Service's opinion evaluates whether the action is likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

### **Status of the Species**

#### *Metcalf Canyon Jewelflower*

Please refer to the *Streptanthus albidus* ssp. *albidus* (*Metcalf Canyon Jewelflower*) *5-Year Review: Summary and Evaluation* (Service 2013) for the most recent comprehensive assessment of the species' range-wide status. No change in the species' listing status was recommended in the 5-year review. Threats evaluated during that review have continued to act on the species since the 2013 5-year review was finalized. While there continues to be loss of habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the jewelflower.

#### *Santa Clara Valley Dudleya*

Please refer to the *5-Year Review Santa Clara Valley Dudleya* (*Dudleya setchellii*) (Service 2021) for the most recent comprehensive assessment of the species' range-wide status. No change in the species' listing status was recommended in the 5-year review. Threats evaluated during that review have continued to act on the species since the 2021 5-year review was finalized. While there continues to be loss of habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the dudleya.

*Bay Checkerspot Butterfly*

Please refer to the *Bay Checkerspot Butterfly* (*Euphydryas editha bayensis*) *5-Year Review: Summary and Evaluation* (Service 2009) for the most recent comprehensive assessment of the range-wide status of the butterfly, which found that because of continued population declines and habitat loss, the butterfly is at greater risk of extinction now than at the time of listing and may warrant reclassification to endangered status. Threats evaluated during that review have continued to act on the species since the 2009 5-year review was finalized. While there has been continued loss of habitat, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the butterfly.

*Valley Elderberry Longhorn Beetle*

Please refer to the *Revised Recovery Plan for Valley Elderberry Longhorn Beetle* (Service 2019a) for the current status of the species. For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the *Withdrawal of the Proposed Rule To Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife* (Service 2014b). Threats evaluated during that review have continued to act on the species since the 2014 withdrawal was finalized. While there continues to be loss of beetle habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the beetle.

*Vernal Pool Fairy Shrimp*

Please refer to the *Vernal Pool Fairy Shrimp* (*Branchinecta lynchi*) *5-year Review: Summary and Evaluation* (Service 2007a) for the most recent comprehensive assessment of the species' range-wide status. No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 5-year review was published, with loss of habitat being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

*Vernal Pool Tadpole Shrimp*

Please refer to the *Vernal Pool Tadpole Shrimp* (*Lepidurus packardii*) *5-year Review: Summary and Evaluation* (Service 2007b) for the most recent comprehensive assessment of the species' range-wide status. No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 5-year review was published, with loss of habitat being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

*California Red-Legged Frog*

Please refer to the *Recovery Plan for the California Red-Legged Frog* (*Rana draytonii*) (Service 2002) for the current status of the species. Threats evaluated during that review and discussed in the recovery plan have continued to act on the species since the review

was published, with loss of habitat being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

#### *California Tiger Salamander*

Please refer to the *California Tiger Salamander Central California Distinct Population Segment (Ambystoma californiense) 5-year Review: Summary and Evaluation* (Service 2014c) for the current status of the species. No change in the species' listing status was recommended in the 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the review was published, with loss of habitat being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

#### *Least Bell's Vireo*

Please refer to the *Least Bell's Vireo (Vireo bellii pusillus) 5-Year Review: Summary and Evaluation* (Service 2006) for the current status of the species. The 5-year review recommended that the species be downlisted to threatened. Threats evaluated during that review have continued to act on the species since the review was published. To date, no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

### **Status of Critical Habitat**

#### *Bay Checkerspot Butterfly Critical Habitat*

Fifteen units of critical habitat for the butterfly were designated by the Service in 2008 (73 Fed. Reg. 50406). The designated critical habitat includes four units in San Mateo County that comprise 1,692 acres and nine units in Santa Clara County that comprise 16,601 acres.

#### *California Red-Legged Frog Critical Habitat*

Critical habitat for the frog was designated in March 2001 (66 Fed. Reg. 14626) and revised in April 2006 (71 Fed. Reg. 19244) and in March 2010 (75 Fed. Reg. 12816). Approximately 1,636,609 acres in 27 California counties fall within the boundaries of the final revised critical habitat designation.

#### *California Tiger Salamander Critical Habitat*

Critical habitat for the salamander was designated in August 2005 (70 Fed. Reg. 49380). The designation includes nearly 200,000 acres across 31 critical habitat units designated in 19 counties.

### **Environmental Baseline**

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the project. The environmental baseline includes the

past and present impacts of all federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

The action area encompasses three U.S. Department of Agriculture Ecoregion sections, the Great Valley, Central Valley Coast Ranges, and Central California Coast. From the I-5 freeway east at or below an elevation of 200 feet above mean sea level (FAMSL) is the Great Valley ecoregion, which is characterized by a low-elevation fluvial plain formed on nonmarine sedimentary rocks with low hills. The cover type is primarily irrigated agriculture with small areas of natural cover types that include annual grasslands, western hardwoods, and wet grasslands or vernal pools. The Great Valley includes the Delta-Mendota Canal and California Aqueduct. The Central Valley Coast Ranges ecoregion approximately begins west of the I-5 freeway at elevations higher than 200 FAMSL, reaching elevations up to 2,200 FAMSL, and ends west at the descent into the Santa Clara Valley back to 200 FAMSL. The landscape of this ecoregion is low-elevation parallel ranges with steep slopes. Rock formations are marine and nonmarine sedimentary origins. Vegetation is western hardwoods, annual grasslands, and chaparral-mountain shrub cover types, and many species are drought-deciduous. The Central Valley Coast Ranges includes the O'Neill Forebay, San Luis Reservoir, Pacheco State Park, and Henry W. Coe State Park. The Santa Clara Valley and into San Jose is the Central California Coast ecoregion; terrain is low to moderate elevation with parallel ranges and valleys. The bedrock is sedimentary, granitic, and ultramafic formations. Vegetation is a mixture of western hardwoods, chaparral-mountain shrub, and annual grasslands cover types, with many of the species adapted to fire. The Central California Coast ecoregion includes San Felipe Lake, Coyote Lake County Park, and Santa Teresa County Park. The climate for all three ecoregions is Mediterranean-like, with mild, wet winters and hot, dry summers with brief periods of drought (USDA 2007).

### *Species*

The Authority used species habitat suitability modeling initially to delineate potentially suitable habitat (hereinafter referred to as *modeled habitat*) and to estimate potential species distribution in the action area along the alignment. It can be reasonably assumed that not all modeled habitat will be occupied. The modeling effort used rule-based models for the the jewelflower, the dudleya, the butterfly, the beetle, the tadpole shrimp, the fairy shrimp, the frog, the salamander, and the vireo.

Rule-based models identified potentially suitable habitat based on scientific literature and species expert input related to the physical and biological habitat parameters associated with species occurrence. *Suitable habitat* is defined as any land cover type that is known to provide the resources and conditions necessary for survival and reproduction of a listed species (Hall et al. 1997). The precision of the species models is greatest in the project corridor, where detailed vegetation mapping was conducted for the permanent and temporary project impact footprints and within 500 feet of the permanent and temporary project impact footprints, using high resolution aerial photography and field reconnaissance surveys where access was available.

The results of the species habitat suitability modeling were applied to the following:

**Impact estimates:** The species habitat suitability models were overlain with the project footprint to determine the total area of potential impact to each species' modeled habitat.

**Developing avoidance and minimization measures and determining habitat offsets:**

Species habitat suitability models provided information for the development and application of species-specific conservation measures and for the determination of the amount of compensatory mitigation that may be required for impacts to each species' habitat.

Metcalf Canyon Jewelflower

The action area contains 938 acres of modeled habitat for the jewelflower in the Monterey Corridor and Morgan Hill and Gilroy project subsections. Approximately 15 acres of modeled habitat for the jewelflower are in the project's temporary disturbance footprint, and approximately 12 acres are in the permanent disturbance footprint.

In the action area, suitable habitat and known occurrences of the jewelflower are in Coyote Valley. There are three California Natural Diversity Database (CNDDDB) jewelflower occurrences located within the action area (CDFW 2019). These occurrences are in Metcalf Canyon, near Dana Rock Park, and Communication Hill, in the City of San Jose.

Santa Clara Valley Dudleya

The action area contains 788 acres of modeled habitat for the dudleya in the Monterey Corridor and Morgan Hill and Gilroy project subsections. Approximately 13 acres of modeled habitat for the dudleya are in the project's temporary disturbance footprint, and approximately 11 acres are in the permanent disturbance footprint. There are seven dudleya occurrences within the action area (CDFW 2019). Some of these occurrences are in Metcalf Canyon, Tulare Hill, and Coyote Ridge.

Bay Checkerspot Butterfly

The action area contains 792 acres of modeled habitat for the butterfly in the Monterey Corridor and Morgan Hill and Gilroy project subsections. Approximately 15 acres of modeled habitat for the butterfly are in the project's temporary disturbance footprint, and approximately 11 acres are in the permanent disturbance footprint and include locations at Communication Hill, Tulare Hill, and Coyote Ridge.

Suitable habitat is mapped where serpentine soils are present outside of the developed portions of the south San Francisco Bay Area in the action area. Communication Hill is not known to be occupied. The butterfly occurs most densely along the east and west sides of Coyote Valley in areas designated as critical habitat and the surrounding vicinity. The action area intersects four CNDDDB occurrences of the butterfly. The largest occurrence (occurrence #17), located on Coyote Ridge in the project footprint, spans more than 5,000 acres and has been documented as containing hundreds of thousands to millions of butterfly larvae (CDFW 2019).

The butterfly population on Tulare Hill is a satellite population<sup>3</sup>; 10 or fewer individuals were observed in annual surveys between 2004 and 2007 (Service 2009) until

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<sup>3</sup> Smaller habitat patches capable of developing robust Bay checkerspot populations in years of favorable weather when the habitat is in good condition.

reintroduction efforts in 2013 boosted population numbers to 124 adults in 2014, 270 adults in 2015, and 270 adults in 2016. However, in 2017 the number of adults observed on Tulare Hill dropped to just six adults (CDFW 2019).

Tulare Hill is a steppingstone between Coyote Ridge and Santa Teresa County Park (i.e., land that facilitates movement between blocks of core habitat) (Service 1998a, 2009). Coyote Ridge contains high-quality serpentine bunchgrass grassland for the butterfly and is known to be occupied.

#### Valley Elderberry Longhorn Beetle

The action area contains 26 acres of modeled habitat for the beetle in the San Joaquin Valley project subsection. Approximately 2 acres of modeled habitat are in the project's permanent disturbance footprint.

Suitable habitat for the beetle overlaps the action area between the Santa Clara–Merced County boundary and the eastern terminus of the action area. Suitable habitat is most densely mapped in the action area in the vicinity of San Luis Reservoir and O'Neill Forebay. Suitable habitat for the beetle indicates the presence of riparian vegetation; however, a comprehensive survey of beetle and elderberry shrubs has not been conducted in the action area. There is limited riparian habitat that could support elderberry shrubs within the action area. There are no CNDDDB occurrences of the beetle in the action area.

#### Vernal Pool Fairy Shrimp

The action area contains 70 acres of modeled habitat for the fairy shrimp in the Pacheco Pass and San Joaquin Valley project subsections. Approximately 3.7 acres of modeled habitat for the fairy shrimp are in the project's permanent disturbance footprint.

Fairy shrimp are known to occur within the Central Coast, San Joaquin Valley, and Southern Sierra Valley vernal pool regions (Service 2005a, 2007a; CDFW 2019). A comprehensive survey of vernal pools or habitat for fairy shrimp has not been conducted in the action area.

The project overlaps with three mapped vernal pools: one on Romero Ranch, north of SR 152; one on the east side of US 165 south of Henry Miller Road; and one along the south side of Henry Miller Road between US 165 and Santa Fe Grade. Based on a review of aerial photography, the habitat adjacent to US 165 is on farmland that has been disked or graded, which may preclude the presence of vernal pool crustaceans. While suitable vernal pool habitat overlaps with the action area, and the action area is within the species' ranges, no CNDDDB occurrences of the fairy shrimp overlap with the action area (CDFW 2019).

#### Vernal Pool Tadpole Shrimp

The action area contains 9 acres of modeled habitat for the tadpole shrimp in the San Joaquin Valley project subsection. Approximately 0.5 acre of modeled habitat for the tadpole shrimp are in the project's permanent disturbance footprint.

In the action area, tadpole shrimp are known to occur within the San Joaquin Valley and Southern Sierra Valley vernal pool regions (Service 2005a; CDFW 2019). Within the San Joaquin Valley vernal pool region, tadpole shrimp are known to occur within the GEA core area (Service 2005a; CDFW 2019), which overlaps with the action area. The project overlaps with two mapped vernal pools: one on the east side of US 165 south of Henry Miller Road and one along the south side of Henry Miller Road between US 165 and Santa Fe Grade. Based on a review of aerial photography, the habitat adjacent to US 165

is on farmland that has been disked or graded, which may preclude the presence of vernal pool crustaceans.

There are no CNDDDB occurrences of tadpole shrimp that overlap with the action area; however, there is one occurrence of tadpole shrimp immediately adjacent to the action area at Santa Fe Grade in Los Banos (CDFW 2019). A comprehensive survey of vernal pools or habitat for tadpole shrimp has not been conducted in the action area.

#### California Red-Legged Frog

The action area contains 4,079 acres of modeled habitat for the frog in the Monterey Corridor, Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley project subsections. Approximately 32 acres of modeled habitat for the frog are in the project's temporary disturbance footprint, and approximately 270 acres are in the permanent disturbance footprint.

Suitable aquatic habitat includes streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, and lagoons with components of submergent or emergent vegetation (Thomson et al. 2016), and terrestrial aestivation or refuge habitat includes moist leaf litter, dense understory, or in small mammal burrows for refuge and foraging (Jennings and Hayes 1994).

The action area overlaps suitable habitat in rural areas (i.e., excludes the heavily developed cities that constitute the south San Francisco Bay area) from the northern end of the action area in San Jose to O'Neill Forebay in eastern Pacheco Pass. Most of the overlap is concentrated along Pacheco Pass. The habitat in this area is primarily mapped as coastal oak woodland interspersed with annual grassland and a network of interconnected streams. Artificial stock ponds also dot the area. Mapped suitable habitat between Pacheco Lake and the Santa Clara County–Merced County line is primarily located along the steep SR 152 transportation corridor and is likely to be made up of small patches of denuded or ruderal habitat and culverted, steeply graded streams. Habitat along the transportation corridor is unlikely to be occupied. Habitat east and west of Pacheco Lake and the county line is up to 0.5 and 1.5 miles away from SR 152, respectively, and is expected to contain higher quality habitat (i.e., intact habitat blocks subject to less disturbance).

There are 12 CNDDDB occurrences of the frog in the action area located at Coyote Valley at Monterey Road, South of Gilroy just west of US 101 (western edge of the Soap Lake complex), and Eastern Pacheco Pass near SR 152 (western edge of San Luis Reservoir) (CDFW 2019).

#### California Tiger Salamander

The action area contains 10,870 acres of modeled habitat for the salamander in the Monterey Corridor, Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley project subsections. Approximately 68 acres of modeled habitat for the salamander are in the project's temporary disturbance footprint, and approximately 1,460 acres are in the permanent disturbance footprint.

Suitable habitat (aquatic breeding sites consist of seasonal ponds, such as vernal pools or other semipermanent calm waters; terrestrial aestivation or refuge sites in lowland grasslands, oak savannah, and mixed woodland habitats with underground retreats in California ground squirrel [*Spermophilus beechyii*] or Botta's pocket gopher [*Thomomys*

*bottae*] burrows) has been mapped within the action area, and there are documented occurrences within the action area.

Suitable habitat is located throughout the natural, undeveloped portions of the action area. There are nine extant occurrences of salamander in the action area (CDFW 2019). There is one location along the alignment that is within the assumed dispersal distance (1.3 miles) of breeding habitat, and it is in this location where there may be movement across the project footprint. It is along Monterey Road in Coyote Valley just south of the Monterey Road and Bailey Avenue interchange. On the east side of the rail in this location, the salamander occurrence is approximately 0.3–0.4 mile from the rail alignment at the Coyote Creek Golf Course. Another cluster of salamander presumed extant occurrences is on the west side of the rail alignment, almost directly west of the Coyote Creek Golf Course, in the foothills of the Santa Cruz Mountains. This occurrence is more than a mile away from the rail alignment.

#### Least Bell's Vireo

The action area contains 478 acres of modeled habitat for the vireo in the Morgan Hill and Gilroy and Pacheco Pass project subsections. Approximately 6 acres of modeled habitat for the vireo are in the project's temporary disturbance footprint, and approximately 67 acres are in the permanent disturbance footprint.

Suitable habitat for breeding and foraging (riparian habitat with a developed canopy layer and dense shrubs (Franzreb 1989; Kus 2002; Service 2006) has been mapped within the action area, and there is one documented occurrence within the action area.

Modeled breeding habitat for the vireo overlaps the action area in Santa Clara County and includes riparian habitat in Coyote Creek, Llagas Creek, Uvas Creek, Pajaro River, and north of Hollister within Pacheco Creek.

There is a historical occurrence of the vireo that overlaps the action area; a portion of this occurrence is within the project footprint. The CNDDDB maps this occurrence as an approximately 3-mile reach of Llagas Creek between SR 152 and the Pajaro River in Santa Clara County near Gilroy. Individuals were detected in June 1997 and May 2001; because specific occurrence location was not provided, the entire reach was mapped in the CNDDDB (CDFW 2019).

#### *Stressors*

Common stressors in the action area to most or all the species include:

- Disturbance to habitat from urbanization, energy development (oil, gas, wind, and solar), grazing, and agriculture
- Impacts from introduction of non-native invasive species (plants and insects)
- Herbicide and pesticide use
- Off-highway vehicle use
- Small population size
- Predation (for wildlife species, including nest brood parasitism for avian species)
- Climate change (including impacts from regional drought and fire)
- Inadequacy of existing regulatory mechanisms

- The presence of roads, routes, trails, railroads, and utility corridors in suitable habitat.
- Vehicle-caused mortality

### *Critical Habitat*

#### Bay Checkerspot Butterfly Critical Habitat

There are 16,600 acres of butterfly critical habitat total, 1,120 acres of which overlap with the action area. The action area intersects four critical habitat units (6, 10, 12, and 13) between the cities of San Jose and San Martin on either side of US 101. Critical habitat unit 6, Tulare Hill, overlaps with 92 acres of the action area and is located within the permanent impact area of the project footprint. The other three intersected critical habitat units, Hale, San Martin, and Kirby, overlap with 198, 191, and 639 acres of the action area, respectively, and are located within the temporary impact area of the project footprint.

#### California Red-Legged Frog Critical Habitat

The final revised critical habitat designation consists of approximately 1,636,609 acres of critical habitat in 27 California counties. The action area overlaps with 4,674 acres of critical habitat unit STC-2 in the Diablo Range section of the project between Gilroy and San Luis Reservoir, where the alignment travels east toward the Central Valley.

#### California Tiger Salamander Critical Habitat

Critical habitat for salamander consists of almost 200,000 acres across 31 critical habitat units designated in 19 counties within four regions. The action area overlaps 267 acres of East Bay Region Units 10A and 10B, and 2,066 acres of San Felipe Unit 12 in Santa Clara and San Benito Counties.

### **Effects of the Action**

Effects of the action are all consequences to listed species or critical habitat that are caused by the project, including the consequences of other activities that are caused by the project. A consequence is caused by the project if it will not occur but for the project and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

The project will result in the temporary and permanent loss of suitable habitat for the jewelflower, dudleya, butterfly, beetle, tadpole shrimp, fairy shrimp, frog, salamander, and vireo. Temporary habitat loss is any ground disturbance that can be restored to pre-disturbance conditions within 1 year. Permanent habitat loss includes ground disturbance that will last more than 1 year or any habitat conversion from suitable to non-suitable.

Table 3 shows maximum habitat loss for the nine federally listed species addressed in this biological opinion and the total compensation for each species. Adverse effects or impacts on species habitat are expressed as the maximum estimated acreage of suitable habitat affected by construction and operations of the project. The calculation of maximum habitat loss for species associated with vernal pools includes the entirety of the feature (i.e., the acreage of indirect bisected effects). Because habitat models were developed to conservatively estimate habitat suitability and the presence of federally

**Table 3. Maximum Temporary and Permanent Loss of Suitable Habitat in the Action Area and Compensatory Mitigation**

Species	Modeled Habitat That Overlaps with the Footprint	Modeled Habitat Loss Where the Species Is Reasonably Certain to Occur (acres)	Compensatory Habitat (acres)
<b>Plants</b>			
Metcalf Canyon jewelflower	27	27	81
Santa Clara Valley dudleya	24	24	72
<b>Bay checkerspot butterfly</b>			
Suitable habitat	26	26	78
<b>Valley elderberry longhorn beetle</b>			
Potentially suitable habitat	160	2	6
<b>Vernal pool fairy shrimp</b>			
Potentially suitable habitat, San Joaquin Valley Recovery Unit	0.5	0.5	1.5
Potentially suitable habitat, Central Coast Recovery Unit	3.2	3.2	9.6
Vernal pool fairy shrimp, TOTAL	3.7	3.7	11.1
<b>Vernal pool tadpole shrimp</b>			
Potentially suitable habitat, San Joaquin Valley Recovery Unit	0.5	0.5	1.5
<b>California red-legged frog</b>			
Potentially suitable aquatic breeding habitat	127	32	96
Potentially suitable upland refugia and foraging habitat	2,385	1,871	3,742
California red-legged frog, TOTAL	2,512	1,903	3,838

Species	Modeled Habitat That Overlaps with the Footprint	Modeled Habitat Loss Where the Species Is Reasonably Certain to Occur (acres)	Compensatory Habitat (acres)
<b>California tiger salamander</b>			
Potentially suitable aquatic breeding habitat	93	57	171
Potentially suitable upland refugia and foraging habitat	2,876	1,471	2,942
California tiger salamander, TOTAL	2,969	1,528	3,113
<b>Least Bell's vireo</b>			
Potentially suitable habitat	77	73	146

listed species is assumed in the absence of surveys, this analysis likely overestimates the magnitude of effects on occupied habitat.

#### *Metcalf Canyon Jewelflower and Santa Clara Valley Dudleya*

The project is anticipated to affect the jewelflower and dudleya where suitable habitat is identified in the action area. The jewelflower and dudleya are reasonably certain to occur on all modeled habitat in the project footprint, which is 27 acres and 24 acres, respectively (Table 3).

Affected habitat corresponds to areas where populations are known to or could occur, and required soil substrates and textures, vegetation communities, and/or elevation exist and where adverse effects on the jewelflower and dudleya are likely to occur if individuals are present. Effects on these species from construction and O&M activities could occur outside the project footprint but are not likely to be adverse.

Permanent loss of suitable habitat will occur at the base of Communication Hill along the existing railway and at the base of Tulare Hill along Monterey Road. Temporary habitat loss will result from establishment of staging areas for electrical reconductoring and infrastructure work, entailing temporary ground disturbance and vegetation removal. Temporary impact areas are located along Coyote Ridge in San Jose, along Llagas Road in Morgan Hill, on private property surrounding the CordeValle Golf Club in San Martin, and in the Soap Lake Region.

There is potential for individuals or seeds to be negatively impacted as a result of project construction, salvage, and relocation. Impacts could occur from the following:

- Removal and mortality during grubbing and clearing and establishment of staging areas and temporary construction easements in or near serpentine rock outcrops and serpentine grassland habitat
- Crushing by vehicles or equipment or burial during excavation

- Digging, transporting, and planting associated with salvage and relocation
- Dust generated from construction activities limiting gas exchange and photosynthesis.

O&M activities (e.g., vehicle access, grading, clearing, excavation, herbicide application) could cause reduced survival of special-status plants inside and adjacent to the project footprint, as well as to individuals that recolonize any remaining suitable serpentine habitat in and adjacent to the project footprint. Chemical runoff from trucks or equipment during construction, operations, and maintenance activities could leach into soils and reduce the vigor of or kill the jewelflower and dudleya. Use of herbicides for weed abatement during operations or maintenance could affect either species outside the right-of-way if they are applied near occupied habitat (e.g., drift effect).

Construction could introduce nonnative plant species that could permanently degrade serpentine grassland habitat. Although serpentine grasslands are typically more resistant to invasion by nonnative species than many other land cover types, nonnative species have potential to eventually degrade serpentine grasslands. For example, barbed goatgrass (*Aegilops triuncialis*) is an invasive grass that has been documented on Coyote Ridge and is the subject of focused management and monitoring by the Santa Clara Valley Open Space Authority (SCVOSA) (McGraw 2015). The introduction or spread of nonnative plants will increase competition for resources (i.e., sun, water, and soil nutrients), negatively affecting flowering success, pollination, seeding, and germination of native plants. The introduction of nonnative plant species may also significantly alter habitat heterogeneity by outcompeting native plants, thereby further facilitating successful invasion of nonnatives. Successful invasion of nonnative plant species could result in permanent degradation of suitable habitat for the jewelflower and the dudleya and negatively affect the fitness of populations that occur within the action area.

Construction could introduce nonnative diseases that could kill jewelflower and dudleya individuals and degrade serpentine grassland habitat. Specifically, introduction of exotic *Phytophthora* species can result in root disease and plant mortality. The *Phytophthora* genus is a group of water molds that can lead to root rot, stem cankers, and blights of fruit and leaves in the host plant. When introduced into native ecosystems, various exotic *Phytophthora* species have proven to be serious to devastating pathogens (Swiecki and Bernhardt 2018). However, the effect of *Phytophthora* species on the jewelflower and the dudleya is currently unknown.

To avoid and minimize effects on these species from the project, the Authority has proposed general and species-specific conservation measures, including pre-construction surveys, establishment of ESAs and non-disturbance zones, and salvage and relocation plans. Suitable habitat for these species that is temporarily disturbed will be restored to pre-disturbance conditions following construction. Compensatory mitigation for the jewelflower and dudleya will also be implemented to offset impacts on suitable habitat.

### *Bay Checkerspot Butterfly*

The project is anticipated to affect the butterfly where suitable habitat is identified in the action area. Butterflies are reasonably certain to occur on all 26 acres of modeled habitat in the project footprint. This habitat corresponds to locations on Communication Hill, Tulare Hill along Monterey Road, and on Coyote Ridge, where serpentine soils may be present and could support the species' larval host plants (*Plantago*) and where adverse effects are likely to occur if butterflies are present. Changes in butterfly behavior from construction and O&M activities could occur outside the project footprint but are not likely to result in adverse effects.

Temporary impact areas are located along Coyote Ridge in San Jose, at Chesbro Reservoir County Park in Morgan Hill, and on private property surrounding the CordeValle Golf Club in

**Table 4. Impacts to Butterfly Critical Habitat**

Unit Number: Name	Total Acres	Impacted Acres	% Remaining
Unit 6: Tulare Hill	348	3	99.14%
Unit 10: Hale	205	5	97.56%
Unit 12: San Martin	189	2	98.94%
Unit 13: Kirby	2,204	13	99.41%
All Butterfly Critical Habitat	18,293	23	99.87%

San Martin. Effects to habitat include staging and temporary construction easements, which could temporarily remove vegetation reducing potential food, perching or egg laying opportunities which could result in reduced individual fitness.

There is potential for individuals to be injured or killed as a result of project construction. Injury and mortality could result from the following:

- Crushing of host plants supporting egg masses and larvae
- Collisions with or crushing of adults feeding on nectar plants by vehicles or equipment operating during the adult flight season (March to April)
- Disturbance and displacement of individuals from noise, vibration, and air turbulence.

The butterfly is considered to be relatively sedentary, although the upper dispersal limit is unknown. This species has only been recorded migrating up to 3.5 miles, but a multiyear study by McKechnie et al. observed that only 1.7 percent of males and 4.8 percent of females moved a distance of approximately 1,600 feet (Service 2009). The project will be sited on the Coyote Valley floor where substantial risk of mortality from vehicle and train strike already exist (US 101, Monterey Road, and Caltrain) for individuals migrating east to west across the alignment, from Coyote Ridge (the core population) to suitable habitat west of US 101 on Tulare Hill or at Santa Teresa County Park. Train operation will increase the risk of vehicle-related mortality in the area, as some individuals could be struck by a passing train.

Train maintenance vehicles or staff could crush adults, larvae, or eggs during inspections, emergency repairs, or vegetation management activities. Use of herbicides for weed abatement during operations or maintenance activities could affect butterfly host plants outside the right-of-way if applied near populations (e.g., drift effect). Chemical runoff from trucks or equipment along the rights-of-way for access roads could leach into soils and reduce the vigor of or kill host plants.

Construction could introduce nonnative invasive plant species that could permanently degrade serpentine grassland habitat. Although serpentine grasslands are typically more resistant to invasion by nonnative species than many other land cover types, nonnative species eventually degrade serpentine grasslands. For example, barbed goatgrass (*Aegilops triuncialis*) is an invasive grass that has been documented on Coyote Ridge and is the subject of focused management and monitoring by the SCVOSA (McGraw 2015: page 68).

To avoid and minimize adverse effects on the butterfly from the project, the Authority has proposed general and species-specific conservation measures including but not limited to pre-

construction surveys, Biological Monitors, establishment of ESAs, and water and dust palliative measures. Suitable habitat for the butterfly that is temporarily disturbed will be restored to pre-disturbance conditions following construction, to the extent feasible. Compensatory mitigation for the butterfly will be implemented for permanent impacts on suitable habitat containing host plants (*Plantago*) on serpentine grassland where butterflies are assumed to be present. Injury and mortality to eggs, larvae, pupae, and adults that occur in suitable habitat impacted by the project where the butterfly is assumed to be present are likely unavoidable due to the cryptic nature of this species during the egg, larvae, and pupae stages and the inability to block the insect from flying into the work area.

#### Bay Checkerspot Butterfly Critical Habitat

The project overlaps with 23 acres of butterfly critical habitat and 4 Units; Tulare Hill (Unit 6) with 3 acres of impacts, Hale (Unit 10) with 5 acres of impacts, San Martin (Unit 12) with 2 acres of impacts, and Kirby (Unit 13) with 13 acres of impacts (Table 4). The permanent project footprint overlaps with 3 acres of critical habitat, which are all in the Tulare Hill Unit. The temporary project footprint overlaps with 20 acres in the Hale, San Martin, and Kirby Units. The following describes each of the butterfly primary constituent elements (PCE) as defined in the critical habitat final rule (73 Fed. Reg. 50406–50452).

- **PCE #1**—Annual or perennial grasslands with little to no overstory that provide north-south and east-west slopes with a tilt of more than 7 degrees for larval host plant survival during periods of atypical weather (for example, drought). The project will temporarily diminish 20 acres and permanently remove 3 acres of the amount of PCE #1 available to the butterfly.
- **PCE #2**—The presence of the primary larval host plant, dwarf plantain (*Plantago erecta*), and at least one of the secondary host plants, purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*), are required for reproduction, feeding, and larval development.
- **PCE #3**—The presence of adult nectar sources for feeding such as desert parsley (*Lomatium* spp), California goldfields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*), sea muilla (*Muilla maritima*), scytheleaf onion (*Allium falcifolium*), false babystars (*Linanthus androsaceus*), and intermediate fiddleneck (*Amsinckia intermedia*).

The temporary disturbance of 20 acres of critical habitat will temporarily diminish the amount of PCE #2 and PCE #3 available to the butterfly.

- **PCE #4**—Soils derived from serpentinite ultramafic rock (Montara, Climara, Henneke, Hentine, and Obispo soil series) or similar soils (Inks, Candlestock, Los Gatos, Fagan, and Barnabe soil series) that provide areas with fewer aggressive, nonnative plant species for larval host plants and adult nectar plants survival and reproduction.
- **PCE #5**—The presence of stable holes and cracks in the soil, and surface rock outcrops that provide shelter for the larval stage of the butterfly during summer diapause. Implementation of the general conservation measures will reduce adverse effects on the butterfly during construction, operations, and maintenance of the project. The Authority will compensate for habitat loss through protection, enhancement, and management of additional habitat, some of which will be within existing critical habitat units. Permanent protection of these lands will help maintain the geographic distribution of the species and contribute to its recovery.

After project impacts, 99.9 percent of all butterfly critical habitat will remain; this extent of habitat loss is not expected to adversely affect the function of the Tulare Hill, Hale, San Martin, and Kirby critical habitat units or butterfly critical habitat throughout the species' range.

#### *Valley Elderberry Longhorn Beetle*

Of the 160 acres of modeled habitat in the project footprint, beetles are reasonably certain to occur in approximately 2 acres of modeled habitat that will be permanently lost due to construction of the project. Permanent habitat loss will occur due to the conversion and disturbance of valley foothill riparian habitat within the project footprint. This habitat corresponds to riparian areas located along Henry Miller Road in Merced County where adverse effects are likely to occur if beetles are present. The remaining 158 acres of modeled habitat are grassland patches on the sides of roads, farm edges, and on levees where the species is not reasonably certain to occur due to the infrequency of elderberry bushes in these habitat types and the lack of known occurrence in the region. Changes in beetle behavior from construction and O&M activities could occur outside the project footprint but are not likely to result in adverse effects.

Construction could indirectly injure or kill the beetle host plant, the elderberry bush, as a result of altered site hydrology (e.g., altered flow and inundation patterns, changes in groundwater availability and water quality) from the installation of impermeable surfaces (e.g., concrete).

Temporary disturbance to riparian areas is expected from staging and temporary construction easements, which could remove host plants.

All temporary impacts to riparian vegetation will be restored in each work area to avoid and minimize indirect habitat degradation (i.e., erosion resulting from ground disturbance, spread of invasive plant species) and the temporal loss of suitable habitat for the beetle.

There is potential for individuals to be injured or killed as a result of project construction. Injury and mortality could occur from the following:

- Construction vehicles or equipment crushing or striking beetles
- Removal or pruning of occupied elderberry shrubs
- Removal or disturbance of valley foothill riparian habitat containing elderberry shrubs
- Removal or disturbance of annual grassland, coastal oak woodland, perennial grassland, or valley oak woodland containing elderberry shrubs within 200 feet of riverine or river, lacustrine habitat
- Disturbance and displacement of individuals may result from noise, vibration, and air turbulence.

Injury or mortality to the beetle could occur during O&M activities, but this is expected to be infrequent given these activities will take place within the developed rail footprint. Because immature beetles are confined to their host plants and adult beetles are generally found close to host plants (Service 2019a), train strike on riparian-dwelling beetles is not expected. However, periodic bridge maintenance activities may require workers and equipment to enter riparian corridors to inspect or work on bridges, and elderberry shrubs occupied by the species may be removed or pruned during such activities.

Construction could introduce invasive plant species that could permanently degrade valley foothill riparian and other suitable habitat. Nonnative invasive plant species may have significant indirect impacts on the beetle by affecting elderberry shrub vigor and recruitment (Talley et al.

2006). Nonnative grasses may also impair elderberry germination or establishment or elevate fire risk (Talley et al. 2006).

To avoid and minimize adverse effects on the beetle from the project, the Authority has proposed general and beetle-specific conservation measures, including but not limited to pre-construction surveys, Biological Monitors, establishment of ESAs, and water and dust palliative measures. Compensatory mitigation for the beetle will be implemented for permanent impacts on suitable habitat containing the elderberry host plant in riparian areas where the beetle has potential to occur. Injury and mortality to eggs, larvae, and pupae by the project are likely unavoidable due to the cryptic nature of this species and its biology (e.g., eggs, larvae, and pupae stages occur inside the stem of the bush with no outward evidence of presence).

#### *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp*

The fairy shrimp and the tadpole shrimp are reasonably certain to occur on all 3.7 and 0.5 acres, respectively, of modeled habitat in the project footprint. Fairy shrimp and tadpole shrimp habitat corresponds to vernal pool and seasonal wetland land cover types within the San Joaquin Valley, along Henry Miller Road. Additional habitat for the fairy shrimp is found on Romero Ranch in eastern Pacheco Pass.

There is potential for individuals to be injured or killed as a result of project construction. Injury and mortality could occur from the following:

- Construction vehicles and equipment crushing individuals or cysts in occupied pools
- Construction activities resulting in the degradation or destruction of aquatic features containing adults or cysts
- Construction activities resulting in altered hydrology of occupied pools so that individuals can no longer complete their life cycle (i.e., drying of pools leading to desiccation and mortality of dormant cysts).

Operation of the train will not affect the tadpole shrimp or fairy shrimp. Train maintenance activities have potential to injure or kill individuals and damage suitable habitat. O&M effects include further habitat degradation from ground disturbance, clearing, or grubbing. These activities could cause erosion and sedimentation that directly affect the hydrology of adjacent vernal pool habitat. Maintenance vehicles or staff could crush individuals during inspections, emergency repairs, or vegetation management activities.

Use of herbicides for weed abatement during operations or maintenance could alter vernal pool vegetation through alterations to water chemistry or shade cover resulting in mortality or increased predation. Chemical runoff from trucks or equipment along the rights-of-way for access roads could leach into pools adjacent to the project and harm or kill individuals. The introduction of nonnative plant species could potentially affect vernal pool hydrology and result in long-term degradation of both vernal pool and upland plant communities.

To avoid and minimize adverse effects on the tadpole shrimp and fairy shrimp from the project, the Authority has proposed general and species-specific conservation measures including but not limited to pre-construction surveys, Biological Monitors, establishment of exclusion zones, and water and dust palliative measures. Compensatory mitigation will be implemented for permanent impacts on suitable vernal pool habitat where individuals are assumed to be present. Injury and mortality to individuals are likely unavoidable due to the size and nature of the species.

### *California Red-Legged Frog*

Of the 2,512 acres of modeled habitat in the project footprint, frogs are reasonably certain to occur in approximately 1,903 acres. This habitat corresponds to areas of aquatic and upland land cover types within 1 mile of suitable aquatic habitat (including Coyote Valley, Soap Lake, and Pacheco Pass) where the species is likely to occur and where adverse effects are anticipated to occur. Frogs are not expected to be present on the remaining 609 acres of modeled habitat due to distance from suitable aquatic habitat, fragmentation by roads and other infrastructure, and development density. Changes in frog behavior from construction and O&M activities could occur outside the project footprint but are not likely to result in adverse effects.

There is potential for individuals to be injured or killed as a result of project construction and relocation. Injury and mortality could occur from the following:

- Construction-related ground disturbance (e.g., grading, earth-moving, vibration, excavation, exclusion fencing) and vehicle and equipment operation that could crush, entomb, or physically disturb individual frogs
- Construction activities resulting in the degradation, destruction, or dewatering of an aquatic feature containing frog adults, juveniles, or eggs
- Dispersing frogs becoming entrapped in construction materials or in excavation(s)
- Disturbance and displacement of individuals from noise and vibration.
- Capturing, transporting, and releasing individuals found within the construction site.

Train O&M activities have the potential to injure or kill frogs. Trains can strike an individual that has entered the railway. Maintenance vehicles or staff could crush a frog during inspections, emergency repairs, or vegetation management activities.

The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause frog mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. The introduction of nonnative plant species to upland habitat could reduce frog dispersal because dense herbaceous vegetation could impede movement.

Amphibian pathogens and parasites can be carried between habitats on the hands, footwear, or equipment of fieldworkers, spreading such pathogens or parasites to novel localities containing species that have had little or no prior contact with them. Construction could introduce nonnative diseases that could kill frogs. One example is chytridiomycosis, an infectious disease that affects amphibians worldwide. It is caused by the chytrid fungus (*Batrachochytrium dendrobatidis*), a fungus capable of causing sporadic deaths in some amphibian populations and 100 percent mortality in others.

The WCA identified two locations along the alignment as having potential to affect frog movement: (1) Monterey Road in Coyote Valley just south of the Monterey Road and Bailey Avenue interchange and (2) SR 152. These are the only two locations along the alignment that are within the assumed dispersal distance (2.0 miles) of presumed extant frog populations where the alignment is at-grade and fenced, therefore posing a potential barrier to movement.

The likelihood that individuals currently move across Monterey Road is low. Coyote Creek and Monterey Road currently provide a considerable barrier to east-west movement in this location. In addition, the occurrence polygons on the west side of the alignment are farther apart than the known dispersal distance (2.0 miles). Nonetheless, project design includes four wildlife undercrossings. These undercrossings are expected to maintain the potential for individuals to

move east and west across the alignment, even though the probability of individuals doing so is considered very low.

To minimize and avoid the effects of the project on the frog, the Authority has proposed general and frog-specific conservation measures, including pre-construction surveys, daily surveys, exclusion fencing, and Biological Monitors. Security fencing will be designed to exclude the species from accessing the right-of-way to avoid injury and mortality of individuals from vehicle or train strikes. Suitable habitat for the frog that is temporarily disturbed will be restored to pre-disturbance conditions following construction, and large continuous swaths of habitat will remain intact adjacent to the project. Compensatory mitigation for the frog will also be implemented for permanent impacts on suitable habitat. Habitat fragmentation and substantial obstruction of movement will be minimized with implementation of wildlife crossing structures proposed throughout the alignment and will provide frogs with movement and dispersal corridors, though it may increase the potential for the species to encounter predators that may also be utilizing the wildlife crossings.

#### California Red-legged Frog Critical Habitat

The project overlaps with 924 acres of the Wilson Peak critical habitat unit (Unit STC-2), 919 acres of which are from permanent activities and 5 of which are from temporary activities (i.e., activities that last less than one year)(Table 5). The frog PCEs as defined in the critical habitat final rule are as follows (75 Fed. Reg. 12816–12959) and all 4 PCEs are within the Wilson Peak critical habitat unit:

- **PCE #1**—Standing bodies of fresh water (with salinities less than 4.5 ppt), including natural and human-made (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years
- **PCE #2**—Freshwater pond and stream habitats, as described under PCE #1, that may not hold water long enough for the species to complete its aquatic life cycle but that provide for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult frogs
- **PCE #3**—Upland areas adjacent to or surrounding breeding and nonbreeding aquatic and riparian habitat up to a distance of 1 mile (1.6 kilometers) in most cases (i.e., depending on surrounding landscape and dispersal barriers), including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the frog.
- **PCE #4**—Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile (1.6 kilometers) of each other and that support movement between such sites

**Table 5. Impacts to Frog Critical Habitat**

Unit Number: Name	Total Acres	Impacted Acres	% Remaining
STC-2: Wilson Peak	204,718	924	99.55%
All Frog Critical Habitat	1,636,609	924	99.94%

Implementation of the general conservation measures will reduce adverse effects on the frog during construction, operations, and maintenance of the project. The Authority will compensate for habitat loss through protection, enhancement, and management of additional habitat, some of which will be within existing critical habitat units. Permanent protection of these lands will help maintain the geographic distribution of the species and contribute to its recovery.

After project impacts, 99.9 percent of all frog critical habitat will remain; this extent of habitat loss is not expected to adversely affect the function of Wilson Peak critical habitat unit and its PCEs.

### *California Tiger Salamander*

Of the 2,969 acres of modeled habitat in the project footprint, salamanders are reasonably certain to occur in 1,528 acres. This habitat corresponds to areas of aquatic and upland land cover types within 1.3 miles of suitable aquatic habitat (including Coyote Valley, Soap Lake, and Pacheco Pass) where the species is likely to occur and where adverse effects are anticipated to occur. Salamanders are not expected to be present on the remaining 1,441 acres of modeled habitat due to distance from suitable aquatic habitat, fragmentation by roads and other infrastructure, and development. Changes in salamander behavior from construction and O&M activities could occur outside the project footprint but are not likely to result in adverse effects.

The project footprint overlaps suitable habitat along the entire alignment, except for the heavily developed cities that constitute the South Bay area. Suitable habitat near existing transportation corridors is likely to be made up of small patches of denuded or ruderal habitat that is separated from larger patches of higher quality habitat by roads, houses, and agricultural development. These areas are unlikely to be occupied.

The greatest potential for the loss of occupied habitat occurs where natural portions of the action area are closest to the project footprint or, in the case of Coyote Valley, where a population may be persisting on a golf course.

Temporary impact areas are distributed along the entire alignment, although most temporary impacts on aquatic breeding and foraging habitat are located east of San Luis Reservoir.

There is potential for individuals to be injured or killed as a result of project construction, burrow inspection/excavation, and relocation. Injury and mortality could occur from the following:

- Construction-related ground disturbance (e.g., grading, earth-moving, excavation, exclusion fencing) that could kill or injure salamanders.
- Construction vehicles crushing individuals or collapsing occupied aestivation refugia in upland habitat.
- Construction activities resulting in the degradation, destruction, or dewatering of an aquatic feature containing salamander adults, juveniles, or eggs.
- Dispersing salamanders becoming entrapped in construction materials or in excavation(s).
- Disturbance and displacement from noise and vibration.
- Capturing, transporting, and releasing individuals found within the construction site.

Train O&M activities have potential to injure or kill salamanders. Trains can strike an individual that has entered the railway. Maintenance vehicles or staff could crush a salamander during inspections, emergency repairs, or vegetation management activities. The use of chemicals and

hazardous substances (e.g., oils, gasoline) during construction may cause salamander mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. The introduction of nonnative plant species to upland habitat could reduce salamander dispersal to nonbreeding sites (i.e., burrows) because dense herbaceous vegetation could impede movement.

To minimize and avoid effects of the project on the salamander, the Authority has proposed general and species-specific conservation measures, including pre-construction surveys, daily surveys, exclusion fencing, and Biological Monitors. Security fencing will be designed to exclude the species from accessing the right-of-way to avoid injury and mortality of individuals from vehicle or train strikes. Suitable habitat for the salamander that is temporarily disturbed will be restored to pre-disturbance conditions following construction, and large continuous swaths of habitat will remain intact adjacent to the project. Compensatory mitigation for the salamander will also be implemented for permanent impacts on suitable habitat. Habitat fragmentation and substantial obstruction of movement will be minimized with the wildlife crossing structures that are proposed as part of the project.

#### California Tiger Salamander Critical Habitat

The project overlaps with 279 acres of the East Bay Geographic Region of critical habitat for salamander, 5 acres of which are in Lion's Peak Unit (East Bay Units 10A and 10B) and 274 acres of which are in San Felipe Unit (East Bay Unit 12)(Table 6). The permanent project footprint overlaps with 274 acres of critical habitat, all of which are in the San Felipe Unit. The temporary project footprint overlaps with 5 acres, 4 acres of which are in the Lion's Peak Unit and 1 acre of which are in the San Felipe Unit. The following describes each of the salamander PCEs as defined in the critical habitat final rule (70 Fed. Reg. 49380–49458).

- **PCE #1**—Standing bodies of fresh water (including natural and human-made (e.g., stock) ponds, vernal pools, and other ephemeral or permanent water bodies, which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.
- **PCE #2**—Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that salamanders depend upon for food, shelter, and protection from the elements and predation. The project will diminish the amount of PCE #2 available to the salamander. The extent to which small mammal burrows or other underground habitat are present is unknown, but this analysis assumes burrows are present in these areas.
- **PCE #3**—Accessible upland dispersal habitat between occupied locations that allows for movement between such sites. The project will adversely affect PCE #3 if the dispersal habitat were diminished to the extent that salamanders could not move between occupied locations or if the project creates movement barriers between occupied locations. The project is not known to disrupt movement between occupied habitat patches within critical habitat.

Implementation of the general conservation measures will reduce adverse effects on the salamander during construction, operations, and maintenance of the project. The Authority will compensate for habitat loss through protection, enhancement, and management of additional habitat, some of which will be within existing critical habitat units. Permanent protection of these lands will help maintain the geographic distribution of the species and contribute to its recovery.

**Table 6. Impacts to Salamander Critical Habitat**

Unit Number: Name	Total Acres	Impacted Acres	% Remaining
East Bay Region Unit 10A and 10B: Lion's Peak Unit	892	5	99.44%
East Bay Region Unit 12: San Felipe Unit	6,642	274	95.87%
All Salamander Critical Habitat	199,109	279	99.86%

After project impacts, 99.8 percent of all salamander critical habitat will remain; this extent of habitat loss is not expected to adversely affect the function of the Lion's Peak and San Felipe critical habitat units or salamander critical habitat throughout the species' range.

#### *Least Bell's Vireo*

The project is anticipated to affect the vireo where suitable habitat is identified in the action area. The population density within the project area is unknown but is anticipated to be low as the species may have only just begun to recolonize areas formally used as breeding habitat within its historic range. Of the 77 acres of modeled habitat in the project footprint, vireos are reasonably certain to occur in approximately 73 acres in the project footprint. This habitat corresponds to areas of suitable riparian habitat in the species' historical range where expanding vireo populations are beginning to recolonize and where adverse effects are likely to occur if vireo are present. Vireos are not expected to be present on the remaining 4 acres of modeled habitat due to small patch size, location, fragmentation by roads and other infrastructure, and development. Changes in vireo behavior from construction and O&M activities could result outside the project footprint but are not likely to result in adverse effects.

There is potential for vireo individuals to be injured or killed as a result of project construction.

Train operations could injure or kill individuals. Injury and mortality could result from the following:

- Injury or death could result from train strike or electrical strike if vireo individuals perch on the alignment and are struck by the train or collide with the electrical line when flying away.
- Vireo individuals could fall into tubular steel OCS poles and become injured or trapped.
- Mortality or injury may result from collisions with vehicles or equipment.
- Disturbance and displacement of individuals may result from noise, vibration, and air turbulence.

Direct effects on the vireo during maintenance activities will likely be minor and sporadic because the HSR will operate on bridges or viaducts that are elevated above riparian corridors. However, periodic bridge maintenance activities may require workers and equipment to enter riparian corridors to inspect or work on bridges, and riparian vegetation occupied by the species may be removed or pruned during such activities.

Chemicals and hazardous substances used during construction (e.g., oils, gasoline) may cause vireo mortality if individuals enter habitat or water collection areas that have been contaminated by accidental spills or other vehicle and equipment leaks, ingest prey that has been contaminated, or bring contaminated plant or other material to the nest.

Ground disturbance and vegetation removal in riparian habitat will create areas of bare soil susceptible to colonization by nonnative invasive plant species such as giant reed, tamarisk, and

perennial pepperweed. Dense stands of these species will degrade riparian habitat for vireos and other riparian birds by outcompeting willows and other native plants that provide nest sites.

There is evidence that migrating birds avoid noisy areas during migration (McClure et al. 2013). Small populations are generally more vulnerable to adverse effects, because the loss of even a few animals may reduce genetic diversity in the population and may impede the potential for individuals to find mates and successfully reproduce.

To minimize or avoid effects of the project on the vireo, the Authority has proposed general and vireo-specific conservation measures including pre-construction nesting bird surveys, Biological Monitors, establishment of ESAs and nondisturbance zones, and bird safe project design. Suitable habitat for the vireo will be restored to pre-disturbance conditions following construction. Compensatory mitigation for the vireo will also be implemented for permanent impacts on suitable habitat.

### *Compensatory Habitat*

The Authority is proposing to provide compensatory habitat as part of the project. This compensatory habitat mitigation is intended to offset the effect on the species of the project's anticipated incidental take, resulting from the permanent and temporary loss, modification, and/or degradation of habitat described above. The compensatory habitat proposed will be in the form of placing conservation easements with long-term management plans on compensatory mitigation sites and the purchase of habitat compensation credits at a Service-approved mitigation site or conservation bank.

The amount of suitable habitat for each species that will be provided as compensatory habitat is as follows:

- Metcalf Canyon jewelflower—81 acres
- Santa Clara Valley dudleya—72 acres
- Bay checkerspot butterfly—78 acres
- Valley elderberry longhorn beetle—6 acres
- Vernal pool fairy shrimp—11.1 acres
- Vernal pool tadpole shrimp—1.5 acres
- California red-legged frog—3,838 acres
- California tiger salamander—3,113 acres
- Least Bell's vireo—146 acres

The Authority will provide compensatory mitigation for impacts on suitable habitat for each species per the above acreages. However, upon design finalization of each CP and completion of the pre-construction habitat assessment surveys, the amount of compensatory mitigation may be adjusted based on revised estimated impacts on species' suitable habitat, if needed, for each work area.

This component of the action will have the effect of protecting and managing lands for the species' conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the project. Providing this compensatory habitat mitigation will offset the loss of habitat and may contribute to other recovery efforts for the species.

## Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the project are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

The Service does not have specific information regarding future non-federal actions within the project action area. However, increased agriculture, urbanization, and human development is reasonably likely to result in increased loss of habitat and a reduction in available food and water resources to support these species.

## Conclusion

After reviewing the current status of the dudleya, jewelflower, butterfly, beetle, tadpole shrimp, fairy shrimp, frog, salamander, and vireo; the environmental baseline for the action area; the effects of the project; and the cumulative effects, it is the Service's biological opinion that the construction of the San Jose to Merced Project Section, as proposed, is not likely to jeopardize the continued existence of these species. The Service reached this conclusion because the project-related effects on the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not result in precluding recovery or appreciably reducing the likelihood of survival of these species based on the following:

- 1) The Conservation Measures are designed to avoid or minimize and offset adverse impacts on these species and their suitable habitat.
- 2) Project activities that will result in temporary and permanent impacts on suitable habitat only occur on a small percentage of such habitat within the action area and throughout the full range of these species, and, as such, will be unlikely to reduce landscape-scale habitat functionality.
- 3) Protection of habitats within the compensatory mitigation sites will preserve and restore suitable habitat in the same recovery areas (as applicable) affected by constructing and operating the project.

After reviewing the current status of designated critical habitat for the butterfly, frog, and salamander; the environmental baseline for the action area; the effects of the San Jose to Merced Project Section; and the cumulative effects, it is the Service's biological opinion that the San Jose to Merced Project Section, as proposed, is not likely to destroy or adversely modify designated critical habitat. The Service reached this conclusion because the project-related effects to the designated critical habitat, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the butterfly, frog, and salamander's critical habitat to serve its intended conservation role for the species based on the following:

- 1) The Conservation Measures are designed to avoid or minimize and offset adverse impacts on these species and their suitable habitat.
- 2) Project activities that will result in temporary and permanent impacts on suitable habitat only occur on a small percentage of such critical habitat within the action area and throughout the full range of these species, and, as such, will be unlikely to reduce landscape-scale habitat functionality.

- 3) Protection of habitats within the compensatory mitigation sites will preserve and restore suitable habitat in the same recovery areas (as applicable) affected by constructing and operating the project.

The effects to the butterfly, frog, and salamander are small and discrete, relative to the entire area designation, and are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of the butterfly, frog, and salamander.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Authority for the exemption in section 7(o)(2) to apply. The Authority has a continuing duty to regulate the activity covered by this incidental take statement. If the Authority (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Authority must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

#### **Amount or Extent of Take**

##### *Bay Checkerspot Butterfly and Valley Elderberry Longhorn Beetle*

The Service anticipates that incidental take of the butterfly and beetle will be difficult to detect due to their life history and ecology. The butterfly inhabits host plants (dwarf plantain or owl's clover) and spends most of its lifespan in the egg or pupa stage, making them difficult to detect. The beetle has short lifespans, with adult males typically living 4 to 5 days, and adult females

living up to 3 weeks. This short adult lifespan coupled with larval development occurring exclusively within the stems of the host elderberry plant make this species difficult to detect. Therefore, the amount of habitat for these species that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that all butterflies within 26 acres of suitable habitat and all beetles within the 2 acres of suitable habitat that will be disturbed by the project could be subject to incidental take in the form of injury, mortality, harm, or harassment.

#### *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp*

The Service anticipates that incidental take of fairy shrimp and tadpole shrimp will be difficult to detect due to their life history and ecology and because the number of individuals within the project action area is unknown. Fairy shrimp are less than 2.5 centimeters in length and cysts become embedded in the dried bottom mud of vernal pools at the end of their lifecycle making them difficult to detect. Tadpole shrimp are less than 3.3 inches in length and also produce cysts that lie buried in the soil until the next winter rains trigger the eggs to hatch. It is difficult to know how many cysts are in the soil of any wetland feature, or how many individuals or eggs will occupy any wetland feature later in time. Therefore, the amount of habitat for these species that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that all fairy shrimp within the 3.7 acres of suitable habitat and all tadpole shrimp within the 0.5 acre of suitable habitat that will be disturbed by the project could be subject to incidental take in the form of injury, mortality, harm, or harassment.

#### *California Red-legged Frog and California Tiger Salamander*

The Service anticipates that incidental take of the frog and the salamander will be difficult to detect due to its life history and ecology. Specifically, the frog and the salamander can be difficult to locate due to their cryptic appearance and finding a dead or injured individual is unlikely due to their relatively small size. Losses of the frog and the salamander may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for these species that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that all frogs within 1,903 acres of suitable habitat and all salamanders within the 1,528 acres of suitable habitat that will be disturbed by the project could be subjected to incidental take in the form of injury, mortality, capture, harm, or harassment.

#### *Least Bell's Vireo*

The Service anticipates that incidental take of vireo will be difficult to detect due to its life history and ecology which includes seasonal fluctuations in populations and an unknown anticipated recolonization rate. Therefore, the amount of habitat for these species that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that all vireo individuals within the 73 acres of suitable habitat that will be disturbed by the project could be subject to incidental take in the form of injury, mortality, harm, or harassment.

Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the San Jose to Merced Project Section in the form of harm, harassment, capture, injury, and death of the frog and the salamander and harm, harassment, injury, and death of the

butterfly, the beetle, fairy shrimp, tadpole shrimp, and the vireo caused by habitat loss, construction activities, and O&M activities will become exempt from the prohibitions described in section 9 of the Act.

### **Effect of the Take**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the butterfly, the beetle, fairy shrimp, tadpole shrimp, the frog, the salamander, and the vireo.

### **Reasonable and Prudent Measures**

All necessary and appropriate measures to avoid or minimize effects on the vireo, the frog, the salamander, the butterfly, the beetle, fairy shrimp, and tadpole shrimp resulting from implementation of the San Jose to Merced Project Section have been incorporated into the project's conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the vireo, the frog, the salamander, the butterfly, the beetle, fairy shrimp, and tadpole shrimp:

- 1) All conservation measures, as described here in the Project Description section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the Act, the Authority must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

- 1) The Authority will include full implementation and adherence to the conservation measures as a condition of any permit or contract issued for the project.
- 2) The Authority will require that all personnel associated with this project are made aware of the conservation measures and the responsibility to implement them fully.
- 3) For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Authority will provide a precise accounting of the total acreage of habitat impacted to the Service on a monthly and annual basis as described in the reporting section of the project description.
- 4) In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Authority will adhere to the reporting requirements described in the project description. The Authority and Service will coordinate annually at a minimum to discuss the project and determine if any adjustments need to be made to the annual limit, the description of covered actions, or any other portion of the project.
- 5) Because it is likely that the Authority will not begin construction on the project for a number of years, the Authority will confer with the Service no less than 1 year before the start of project construction to assess any changes to the project, the species baseline in the action area, and potential changes to the effects from the project on listed species. This process will ensure that the assessment of impacts and proposed avoidance and

minimization measures within this opinion are still accurate and reflect existing conditions on the ground.

### **Salvage and Disposition of Individuals:**

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the San Joaquin Valley Division Supervisor at the Sacramento Fish and Wildlife Office at (916) 414-6544.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a project on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

- 1) The Authority should continue to work with the Service to assist us in meeting the goals of the *Draft Recovery Plan for the Least Bell's Vireo* (Service 1998b), *Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*)* (Service 2002), *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*)* (Service 2017a), *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998a), *Revised Recovery Plan for Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)* (Service 2019a), and *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005a).

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

### **REINITIATION—CLOSING STATEMENT**

This concludes formal consultation on the California High-Speed Rail System: San Jose to Merced Project Section. As provided in 50 CFR §402.16(a), reinitiation of consultation is required and shall be requested by the federal agency or by the Service where discretionary federal involvement or control over the action has been retained or is authorized by law, and:

- 1) If the amount or extent of taking specified in the incidental take statement is exceeded;
- 2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- 3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or written concurrence, or

- 4) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Maggie Sepulveda, Senior Fish and Wildlife Biologist, at [margaret\\_sepulveda@fws.gov](mailto:margaret_sepulveda@fws.gov) or (916) 414-6512 or Patricia Cole, Supervisor, San Joaquin Valley Division, at [patricia\\_cole@fws.gov](mailto:patricia_cole@fws.gov) or (916) 414-6544, or the letterhead address.

Sincerely,

Michael Fris  
Field Supervisor

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